The NATIONAL GEOGRAPHIC MAGAZINE

Vol. XX JUNE, 1909 No. 6

CONTENTS

The World's Highest Altitudes and First Ascents. By Charles E. Fay. With 25 Illustrations.

A Wonderland of Glaciers and Snow. By Milnor Roberts. With 8 Illustrations.

The Highest Point in Each State. Illustrated.

Brittany, The Land of the Sardine. By Hugh M. Smith. With 24 Illustrations.

When Our Country is Fifty Years Older. By Raphael Zon. Illustrated.

The National Geographic Society Expedition to Alaska.

Wonderful Scenes in India.

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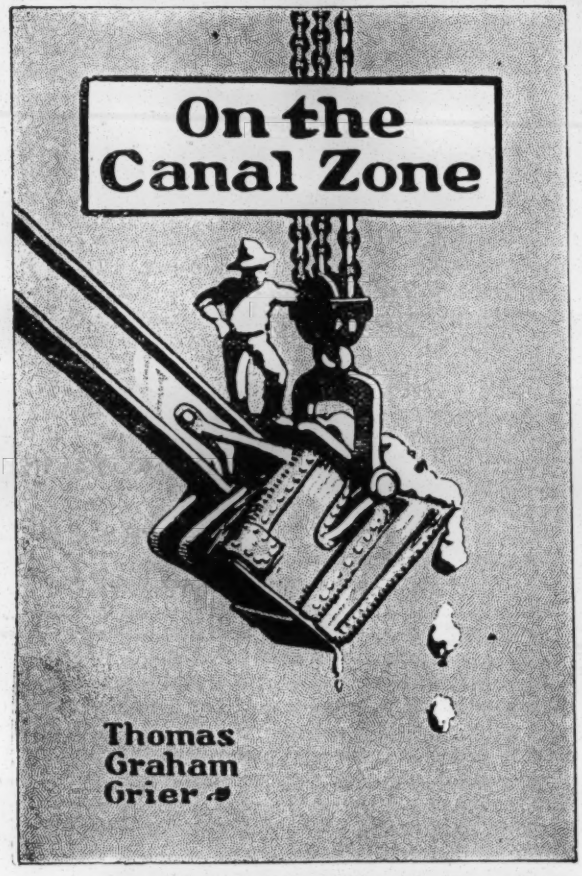

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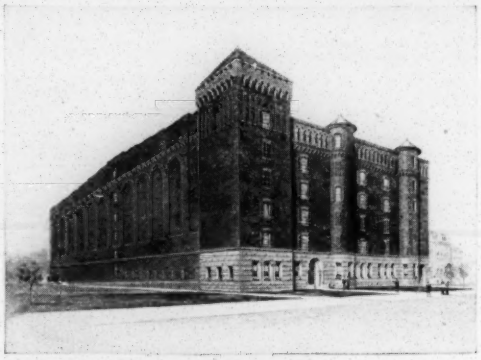

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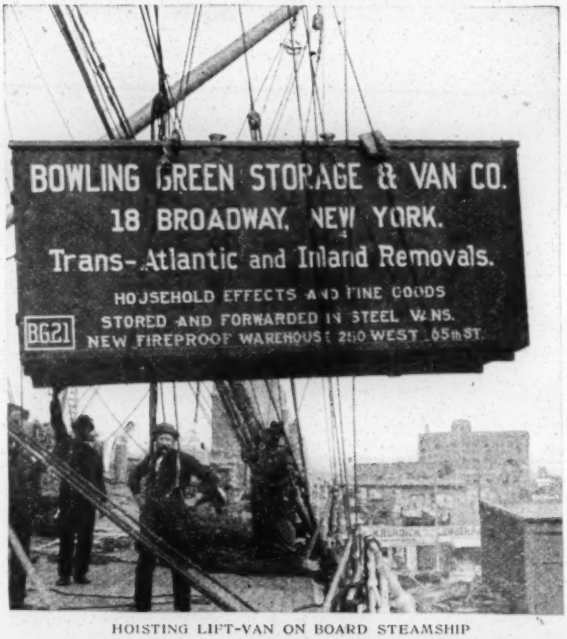
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VOL. XX, No. 6 WASHINGTON JUNE, 1909

THE NATIONAL GEOGRAPHIC MAGAZINE

THE WORLD'S HIGHEST ALTITUDES AND FIRST ASCENTS

BY CHARLES E. FAY, A. M., LITT. D.

PRESIDENT (1878, 1881, 1893, 1905) OF THE APPALACHIAN MOUNTAIN CLUB
FIRST PRESIDENT OF THE AMERICAN ALPINE CLUB

NO field of geographic exploration, not even the kindred one of polar quests, has proved so fascinating during the last half century as that of lofty mountains in the various quarters of our globe. Naturally, therefore, any attempt in a single article to more than outline our present knowledge of its highest altitudes and the manner in which this knowledge has been attained would prove disappointing.

That the lure of the heights is no new one comes home to whoever catches sight of Mr W. A. B. Coolidge's masterly work "*Josias Simler ou l'alpinisme depuis ses origines jusqu'en 1600*," setting forth the history of mountaineering *previous* to the year 1600—a volume of a thousand pages! But modern mountaineering dates from nearly two centuries later—from the first ascent of Mont Blanc, in 1786—and for more than half a century ascents of importance were rare and confined almost exclusively to the Alps. Another epoch-making date was 1857, in which year was founded the English Alpine Club, destined to become the prototype of more than eight score similar organizations, represented in nearly every civilized land, societies whose leaders generally turned to "the playground of Europe" for the enjoyment of their chosen recreation. Hence it is not strange that in the next quarter of a century Switzerland and Tyrol had become hackneyed, with scarcely an important peak left unclimbed.

Probably there is no domain in which the element of pure sport has allied itself to so great an extent with a genuine spirit of scientific research to further human knowledge. The ice-world even of the Alps, with all its interesting problems of "the forms of water," glaciers and mountain meteorology, had been little known, save in general features, before the visitation of these men of leisure, in many of whom there existed a vigorous germ of that scientific curiosity which, coupled with the subtle primary appetite that the Germans call *wanderlust*, furnishes forth the true explorer.

We do not forget that famous naturalists, like Alexander von Humboldt and Sir Joseph Hooker, and certain enterprising surveyors had carried on their investigations in fields as grand and remote as the Andes and the Himalayas;

Photo by H. F. Reid

THE MOST FAMOUS OF MOUNTAINS, MOUNT ARARAT IN ARMENIA

The peaks seen in the picture are Great Ararat (17,000 feet), and Little Ararat (13,000). They are about 7 miles apart and form the boundary of Russia, Persia, and Turkey, to each of which they partly belong

yet, lacking in technical skill as alpinists, they usually failed to reach and explore the loftier altitudes of the regions visited; and it was not until toward the close of the sixties of the last century that the pioneers of a more extended and intensive study of the mountain ranges of the world began to turn their attention to remoter fields.

In 1868 Messrs Freshfield, Tucker, and Moore, of the English Alpine Club, visited the Caucasus and made the first ascent of Elbruz (18,347) at the westerly and of Kasbek (16,546) at the easterly end of the great central chain. They may perhaps be regarded as the pioneers of a different type of mountain exploration and certainly as the revealers, if not discoverers, of a new "playground" on the confines of Europe and Asia, destined to witness in the last two decades of the century the coming of experts of different nationalities, who soon would leave, as in the Alps, no remote valley unvisited and no proud summit unvanquished.

THE GREATEST RANGES

A glance at the map of the world shows upon the several continents vast systems of mountain ranges or striking instances of isolated peaks. To note only the principal ones: we have here upon our Western Hemisphere that belt of varying width, which, rising to markedly different altitudes, extends from the Arctic Ocean to Cape Horn—a distance of hardly less than ten thousand miles. In Alaska it attains 18,100 feet in Mount Saint Elias, about 19,000 in Mount Logan, a comparatively near neighbor, and over 20,000 in Mount McKinley, some degrees nearer the Arctic Circle.* In South America, from the Equator southward, it soars yet higher in such giants as Chimborazo, Huascaran, Sorata, and Aconcagua. It is here that the Western Continent reaches its culminating altitudes.

* That no such lofty peaks as Mounts Brown and Hooker, respectively credited with altitudes of 15,900 and 16,980 feet, are to be found where geographies have for years located them in British America should now be known to all.

In Asia a similarly irregular, and much interrupted, chain runs in a general southeasterly direction from near the Black Sea. Beginning with the Caucasus and passing by way of the Elburz Mountains, several minor ranges, and the Hindu Kush to the mighty Himalayas, which for a distance of over twelve hundred miles form the northern frontier of India, it extends to the sources of the Brahmaputra and the Irawadi; great spurs like the Kuen Lun Mountains and the trans-Himalayan range, lately explored by Sven Hedin, strike eastward from it. This system has a reach of perhaps 4,000 miles, and in it (is it in Mount Everest, 29,002 feet, or some loftier peak, possibly once or twice caught sight of by men of the Occident?) we have the crown of the world. Yet farther north, in central Asia, another notable range, very recently explored, must also be mentioned, for in it rise peaks of truly Himalayan proportions—the Tian-Shan Mountains, with Khan Tengri, some 23,600 feet in altitude.

Compared with these great systems, such limited regions as the European Alps sink into insignificance; and yet for inspiring grandeur and variety and beauty of form, also as a school for the art of climbing on crag and snows, these readily accessible peaks will always retain their prestige.

The vast continent of Africa presents no corresponding mountain system. The Atlas range in the north is of minor importance; for, while its summits surpass 13,000 feet, they are devoid of alpine features. Yet almost upon the Equator, east of the median line of the continent and in the neighborhood of the great lakes at the sources of the Nile, a complex of snowy peaks, Ruwenzori, and yet farther east and south isolated giants like Kenia and Kilimanjaro, rise to altitudes far surpassing Europe's long boasted "monarch of mountains." Mont Blanc measures 15,781 feet above the sea. Kenia is 18,620 feet; Kilimanjaro, 19,680, while nine of the chief summits of Ruwenzori measure between 15,800 and 16,815 feet.

The isles of the sea are not without their claimants for honor. If, in our extreme deference for crowns of snow, we pass by the Hawaiian volcano Mauna Kea (13,953), primate of the peaks of the Pacific, and Fuji-San (12,365), the sacred mountain of Japan, and its compeers, we shall find on the southern island of New Zealand, at a latitude of its hemisphere about that of our White Mountains of New England, a splendid range of glacier-bearing peaks, the Southern Alps, culminating in Mount Cook or Aorangi (12,349), a mighty pinnacle of rock and ice. On the island of New Guinea also there are mountains of even greater height, a peak of the Charles Louis range, in the Dutch dominions, being credited with an elevation of 16,730 feet.* In the Atlantic the Pico de Teyde, on the island of Teneriffe, lifts the summit of its graceful volcanic cone to 12,182 feet. Spitsbergen, in the Arctic, with its peaks rising 3,000 to 4,000 feet, one of which was climbed by Scoresby in 1818, has invited several able climbers since 1896.†

But most recent geographical news‡ presents the polar regions themselves as a field for alpinism. Peary, in his last expedition (1905), ascended a low peak (2,050), and now among the interesting details of Lieut. Shackleton's remarkable explorations in the Antarctic we hear of the discovery, in near proximity to the pole, of a lofty plateau upon which his party attained an altitude of 10,500, and inferred that the southern end of the axis of our planet is in this table land. How appropriate if it were a culminating peak of it! Pending such a revelation and the subsequent conquest of its summit, we can congratulate Professor David and his party, who, in connection with this expedition, scaled Mount Erebus (13,120) and brought interesting reports from its ancient crater.

*We note that a British expedition is now being fitted out to explore these mountains.

†First Crossing of Spitsbergen. Sir W. M. Conway. London, Dent & Co., 1897.

‡Nature, March 25, 1909.

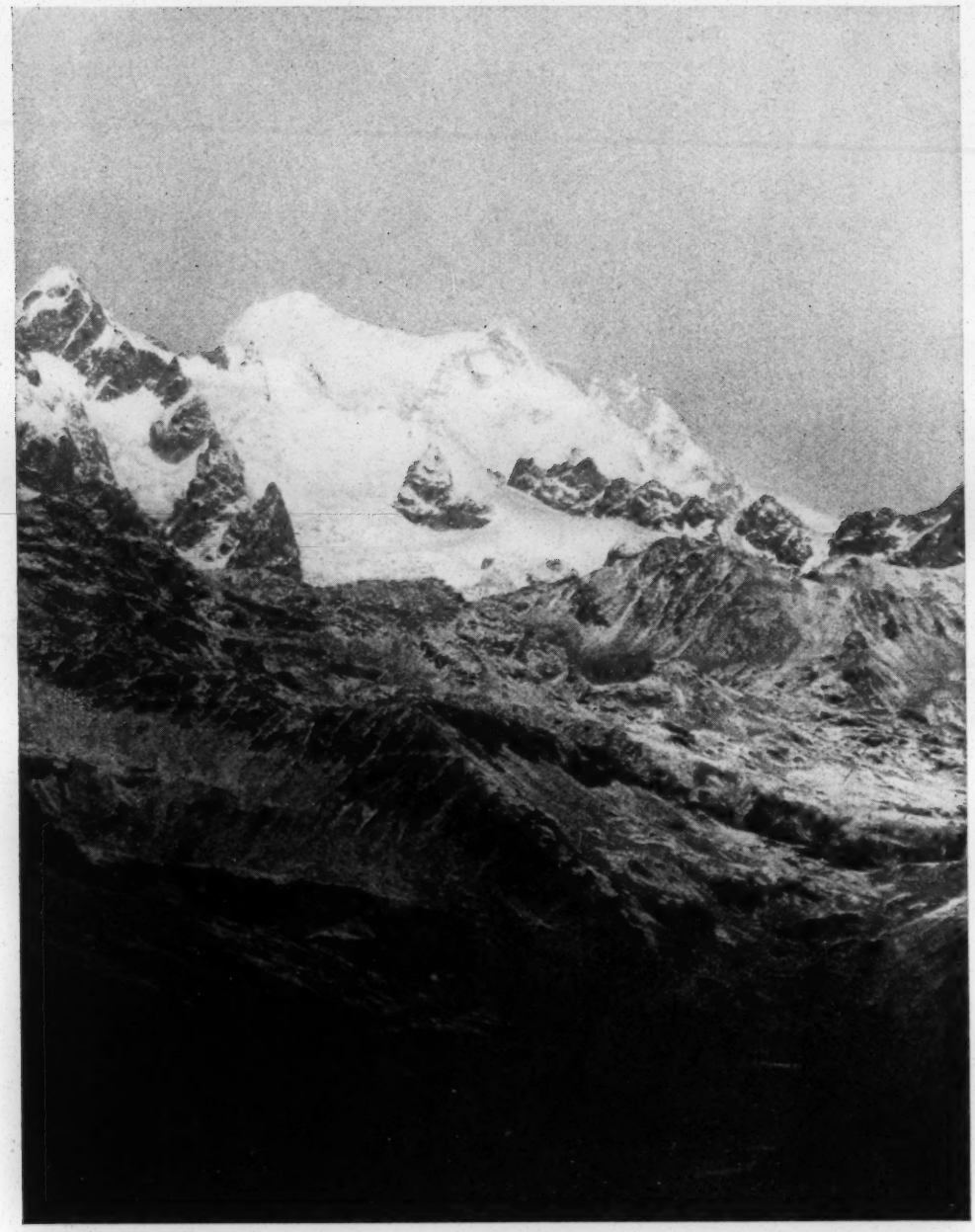
FIRST ASCENTS

Having presented a rough sketch of the world-wide field, let us seek to furnish somewhat more in detail a register of the notable ascents accomplished in these different regions, keeping so far as may be to the chronological order of their exploration, and endeavoring to give proper credit, if not always, by reason of the embarrassing wealth of material, to individuals, at least to the nationalities represented.

To the average reader, unfamiliar with the climber's craft, mere altitude is likely to be the impressive fact in a comparative appreciation of the difficulty and danger of mountain ascents; yet a table of heights by no means conveys adequate information upon these points. Aside from the serious hardship occasioned to nearly all persons at great altitudes, apparently by the diminished quantity of oxygen, even the loftiest summits might prove of comparatively easy access, once the base were reached. Judging from its outline and snows, as shown in Signor Sella's telephotographic view of the peak from the Chunjerma Pass, Mount Everest itself would be set down as an easy mountain; that is, as offering no serious technical difficulties to the skilled climber. Mont Blanc was first climbed by an untrained Chamonix peasant, alone, in a two days' trip. For difficulty and danger, this monarch of the Alps is far surpassed by many lesser peaks—nay, by several of the *aiguilles* (needles) of its own neighborhood—the Blaitière, Grands Charmoz, Dru, Grépon, and Dames Anglaises; yet these crags are only from 11,300 to 12,300 feet high, with their bases high up on the outreaching spurs of the great white mountain.

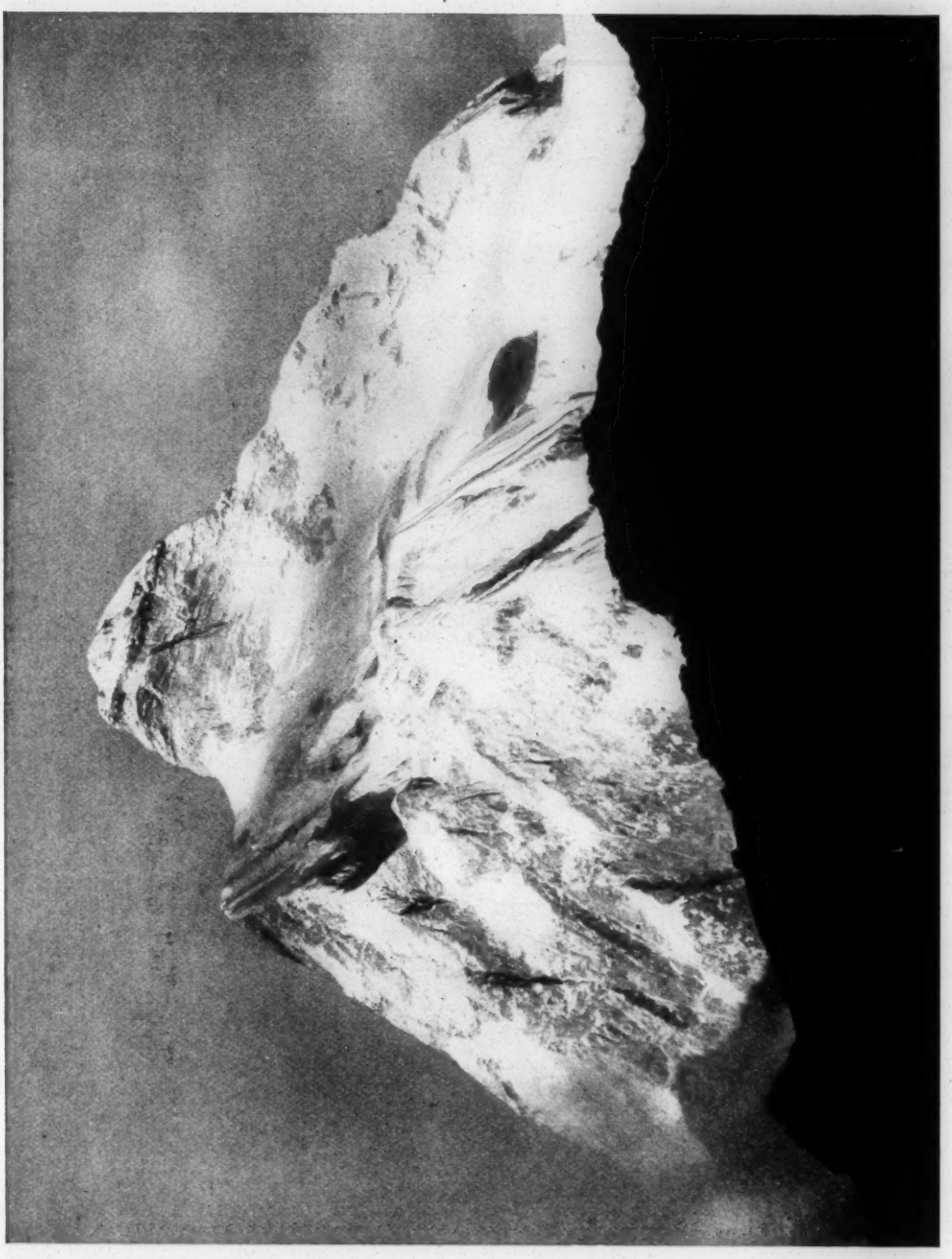
It was as late as 1901, seven years after his remarkable campaign in which he had accomplished in one month eight*

*Aiguille du Moine (11,198), Aiguille des Charmoz (11,293), Petit Dru (12,245), Aiguille de Grépon (11,447), Dent Blanche (14,318), Zinal Rothorn (13,856), two peaks of Monte Rosa (15,217 and 14,965), and the most difficult of the ascents of the Matterhorn (14,782), that over the Zmutt arête.



THE CROWN OF THE WORLD—THE HIGHEST PEAK KNOWN—MOUNT EVEREST, 29,002 FEET

From a telephotograph by Vittorio Sella, taken from Chunjerma Pass (Nepal), about 80 miles distant



THE SUMMIT OF JANNOO IN THE HIMALAYAS, 25,000 FEET HIGH Telephoto by Vittorio Sella

of the most difficult climbing feats of the Alps, four years after his conquest of Mount Saint Elias, and the year following his notable success in securing the "Farthest North" for his polar expedition, that Prince Luigi of Savoy made the first ascent of the second in height of the Dames Anglaises and christened it "Yolanda Peak." Later he made the first ascent of the Aiguille Sans Nom. It was with climbs of this type in mind that the historiographer of the Alaskan expedition could say concerning this ascent of Mount Saint Elias, whose conquest required nearly forty days' journey over glaciers and névé nearly the entire distance from the shore of an inhospitable sea to the altitude of 18,100 feet, that "if the winning of Saint Elias only meant the ascent of the terminal cone . . . it might be compared with many of the easier climbs in our own Alps."

In determining, then, from a consideration of hardship and sacrifice, what comparative credit shall be accorded to those who bring to us the knowledge of the world's mysterious heights, we must consider not only the inherent difficulties offered by the type of mountain ascended, but its remoteness from civilization; the character of the country to be traversed in reaching its base; the height of snow-line; the climate, whether temperate or affording such contrasts as those reported by Doctor and Mrs Workman on the occasion of their recent climbing (1906) in the Nun Kun Himalayas, where, at an altitude of over 21,300 feet, the mercury in the tube of the solar thermometer fell from 193 F. to 4 degrees below zero within fifteen hours, or amid such comfortless surroundings as those of Doctor Cook and his single companion, passing the last night of their four days' ascent of Mount McKinley in a cavity stamped out in the steep snow slope, with a thermometric reading of 11° below zero. Then there are such dangers as the risks from savage or ill-disposed natives, as in some of the valleys of the Caucasus and beyond the English sphere of influence in the Himalayas, or insidious fever and the deadly "sleeping sickness" of the forests of Equatorial Africa, to say nothing of the vexatious problems arising from the necessities of transportation of supplies by undisciplined porters. Considering these things, even the ascents of very lofty summits that look down upon considerable towns, affording many "creature comforts," that lie nestled at their already lofty bases, and where vicariously panting mules may bear one comfortably to the soaring snow-line, seem to call for a less strenuous type of explorer. This we set down, not that we esteem such labors less, but the others more.

To one who has kept in touch with the increasing volume of alpine literature during the past three decades, it has been interesting to note in how brief a time strange and outlandish names come to have a familiar sound and acquire the power to summon before the mental vision some superb "mountain majesty." This latter satisfaction is due to the fortunate circumstance that the development of photography and the modern arts of reproduction from photographs occurred coincidently with this entrance of man upon new and glorious scenes. Hence the magnificent illustrations, that speak far more eloquently than any human pen, which make many of the voluminous works that describe the newly visited regions works of the highest art.

THE CAUCASUS

All this is particularly true of the Caucasus. To Elbruz and Kasbek, which summed our earlier total of local nomenclature, there was suddenly added the names of a whole series of supremely beautiful glacier-bearing peaks: Dychtau (17,054), Shkara (17,038), Koshtantau (16,880), Janga (16,569), Tetnuld (15,918), Ushba (15,400), and Adai Khokh (15,244). These are the giants of the central group. Mr Freshfield tells us that "in a space some ten miles square . . . are to be found not less than twenty distinct summits of over 14,000 feet." And the chief of these were climbed between the years 1884-1895 by English, Hungarian, and German alpinists.

Some of the names of the victors recur several times in the annals of conquest. We have named the pioneers of 1868, members of the Alpine Club. Moore, of that party, returned with F. C. Grove and others of the club in 1874, and scaled with them the western, slightly higher, of the twin domes of Elbruz (18,470), like its fellow an easy mountain. Déchy, a Hungarian alpinist and expert photographer, came first in 1884, then in the three following years, devoting his efforts rather to the glaciers and passes than to the high summits, and procuring the remarkable views that adorn his recently published volumes.* Dent came again with Donkin in 1886 and climbed Gestola (15,932). They both returned in 1888 with Fox added to their party. A fortunate indisposition detained Dent, while Fox and Donkin went on to climb Dongosorun (14,547), and then to attack the stronghold of Koshtantau. Here they and their guide perished; just how we shall never know. To solve the sad mystery Dent returned a year later with Freshfield, H. Wooley, the present president of the Alpine Club, and others, and found high up on the grand peak the last bivouac of their lost associates. Wooley succeeded in scaling the fateful summit. It was in 1889 and 1890 that Signor Sella made his visits, combining, like Déchy, photography with exploration, yet ascending more peaks, and securing that superb collection of views later used in collaboration with Mr Freshfield.†

Doubtless the most impressive of all the Caucasian giants in its aspiring grandeur is the double-towered Ushba, so stationed on the watershed of two continents that one of its peaks is in Europe, the other in Asia. The former was climbed in 1888 by Mr Cockin (A. C.), who that same year vanquished Shkara and Janga, and later, in 1890, Adai-Khokh and two other high peaks, in 1893 yet others, but in 1895 was foiled in his attempt on the southern tower of Ushba. This was secured in 1903, after a repulse that nearly cost him his life, by Herr A. Schulze with others.*

Germany was also represented as early as 1891 by Herren Purtscheller and Merzbacher, of whom the former had climbed Kilimanjaro in 1887, and the latter was to distinguish himself as a pioneer in the Tian-Shan Mountains.

NEW ZEALAND ALPS

If the keen interest that had attended the continued revelations from this semi-adjacent region of the Caucasus was beginning to wane at the end of the eighties, new matter came pouring in from various quarters to whet the appetite for alpine grandeurs. The Rev. W. S. Green (A. C.) had visited New Zealand in 1882† and ascended Mount Cook (Aorangi), which attains an altitude of 12,349 feet. A pioneer there at the antipodes, stimulating the ambition of the young men of that new country and exciting other emulation nearer home, he shortly directed his steps to the freshly opened mountain region of British Columbia, and here, too, became the forerunner of a new generation of alpinists, bringing out the first mountaineering book for this new Switzerland.‡

A New Zealand Alpine Club was formed in 1891, and not only its own periodical but also the pages of the *Alpine Journal* have since brought out numerous articles descriptive of the noble scenery and stirring adventures among these Southern Alps. Of its members one of the most active has been Mr G. E. Mannering, author of "With Axe and Rope in the New Zealand Alps" (Longmans, 1891). Doubtless the most exciting of the works§ that deal with this region is that of Mr E. A. Fitzgerald (destined later to be heard from in an-

* Kaukasus, 3 vols., Berlin, D. Riemer, 1905.

† The Exploration of the Caucasus, 2 vols. Arnold, London & New York, 1896.

* For a most spirited description, see article by W. R. Rickmers, "Personally conducted: Suanetia in 1903," Alpine Journal, Nos. 166, 167.

† The High Alps of New Zealand (Macmillan, 1883).

‡ Among the Selkirk Glaciers (Macmillan, 1890).

§ Climbs in the New Zealand Alps (Scribners, 1896).

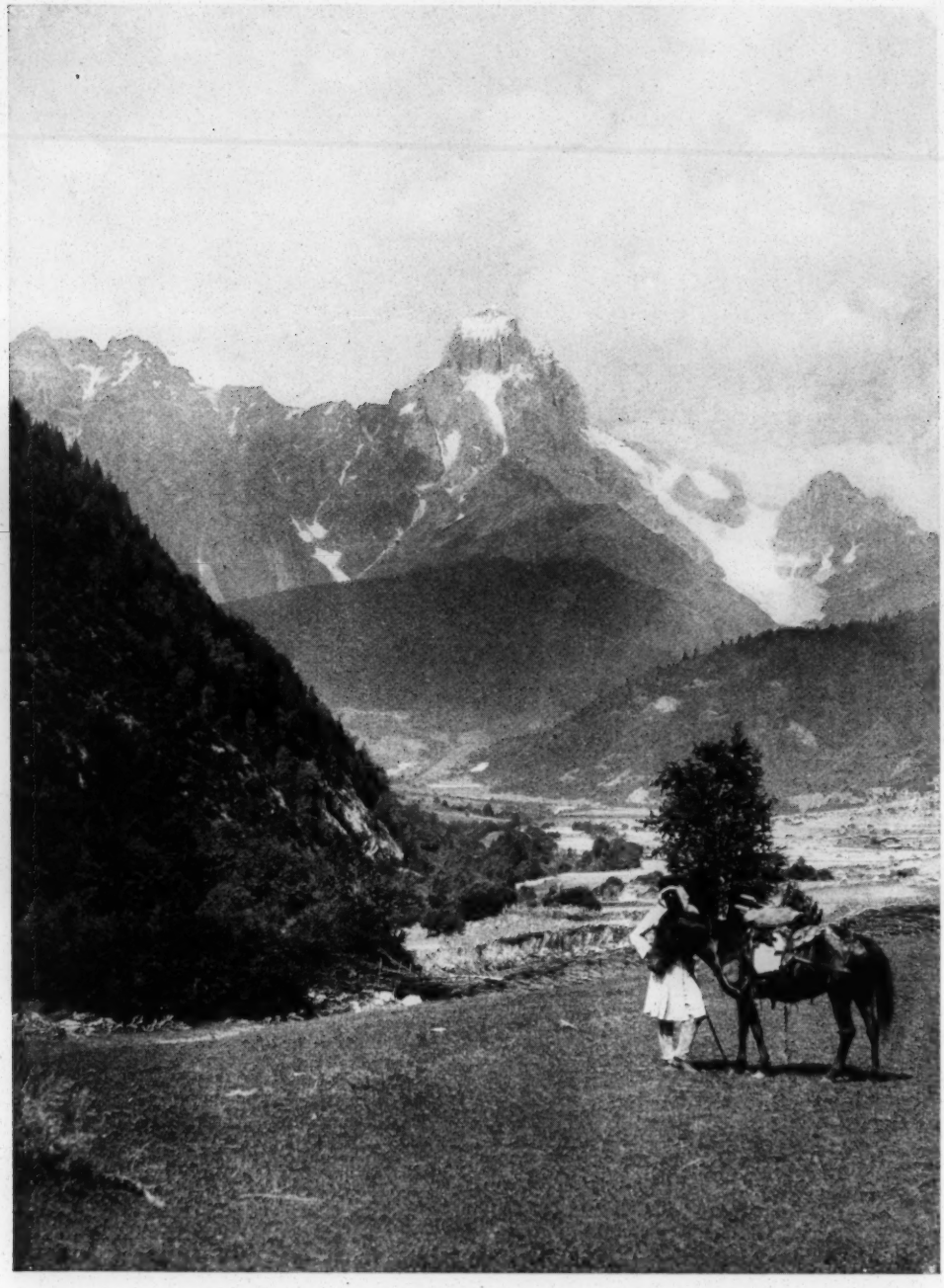


Photo by Vittorio Sella

THE MOST IMPRESSIVE OF ALL CAUCASIAN GIANTS, USHBA, ONE OF WHOSE PEAKS IS IN EUROPE AND ONE IN ASIA

IN THE SOUTHERN ALPS OF NEW ZEALAND

other quarter), who in 1895 made several brilliant ascents, including the Silverhorn, Sefton, and Cook. Among the episodes, the story of his slip on Sefton and hanging in mid-air supported only by the rope in the hands of Zurbriggen, himself but insecurely placed, is one of the sort calculated to make the heart, even of the experienced climber, stand still.

Before touching upon that other region where Green must be regarded as the pioneer, let us note what was going on at about the same time among peaks that for combined altitude and inaccessibility hold the primacy of the world.

THE HIMALAYAS

The stupendous character of this range almost baffles our imagination. Aided by Sella's matchless photographs, we come to appreciate the sublimity of its individual peaks, but how comprehend their multitude? From the Sikkim Himalayas to the Karakorams, say from Kangchenjunga to K_2, the air-line distance is approximately that from Washington to Saint Paul, nearly all the way guarded by those giant watch-towers. The Garhwal district, with Nanda Devi (25,689), Trisul (23,406), and other notable peaks recently come into special prominence, is about midway of these extremes. It is in these three sections that the principal explorations of alpinists have been made.

High ascents in the interest of science began here comparatively early. The brothers Schlagintweit, German naturalists, who conducted investigations (1854-57), in all these regions, unlike most purely scientific travelers, had had experience in the first ascent (except by guides) of the Grenzgipfel of Monte Rosa in 1851, aided by which they attained here an altitude long unsurpassed. There is a presumption approaching probability that the late W. H. Johnson, a surveyor of the Government Topographical Survey, reached in 1865 a record that has never been much exceeded (23,890 feet) on E 61 of the Kuen Lun range.

The more recent work of skilled alpinists began with Mr W. W. Graham's visit in 1883. After two ascents to above 22,500 feet in the Garhwal, he made his famous assault on Kabru (24,015) in the Sikkim region, the nearest neighbor westerly from Kangchenjunga. His report of this ascent was made at a meeting of the Royal Geographical Society and printed in its Proceedings.* It reads like the story of an honest man, and no one doubts that he was an experienced climber. Received with flattering approval at this meeting, his story was shortly attacked as improbable, principally from the absence of the customary allusions to mountain sickness. From that time there have existed two camps with regard to Graham's accomplishment. It must be confessed that the competency of his supporters, joined with recent testimony, creates a very strong presumption in his favor.

Nine years later (1892) Sir Martin Conway undertook an expedition to the great glaciers of the Karakoram range, and in a grand tour, during which he passed eighty-four days on ice and snow, he explored the Hispar, Biafo, and Baltoro glaciers and climbed, among others, Crystal (19,400) and Pioneer (23,000) peaks. Major Bruce, of the British army, who was a member of Sir Martin Conway's party, continued his climbing for several seasons thereafter in various sections of the Himalayas, traversing new passes and climbing virgin summits, and was a member of the party of Doctor Longstaff in 1907, of which more directly.

In 1895 two of England's most famous mountaineers, Mr A. F. Mummery and Professor J. N. Collie, both expert cragsmen who, among other prowesses, had traversed the audacious route by the Zmutt arête to the summit of the Matterhorn, made an expedition to Kashmere, having especially in view the ascent of Nanga Parbat (26,629), a peak not yielding in majesty, nor perhaps difficulty, to any of its few superiors in actual altitude. In their reconnoissances they ascended the beautiful Daimirai Peak (19,000), and Mummery reached a point on the

*Vol. VI, August, 1884.

principal mountain over 20,000 feet. A few days later, with two natives with whom he had started to study another side of the mountain for a more feasible route, he perished in some unknown manner.*

It was in 1898 that Doctor and Mrs W. H. Workman, of Worcester, Massachusetts, began the series of excursions that have placed their names among the very highest on the roll of Himalayan explorers. That year they traversed several high passes; the following, they reached Hispar Pass and climbed the Siegfried Horn (18,600), Mount Bullock-Workman (19,450), and Koser Gunge (21,000). In 1902 they explored the Chogo-Lungma Glacier and three of its principal branches, climbing also several secondary peaks; in 1903 they explored the Hoh Lumba and Sosbon glaciers to their sources and made first ascents of Mount Chogo (21,500) and Mount Lungma (22,568); in 1906 they made the first exploration of the Nun Kun range, in which expedition Mrs Bullock-Workman reached the summit of Pinnacle Peak (23,300); they also climbed in this year Mount Nieves Penitentes (19,080) and D_1 (20,571). During the season of 1908 they successfully completed a detailed survey of the Hunza-Nagar and Hispar glaciers. From a camp at over 19,000 feet, near the Hispar Pass, they climbed a "very abrupt knife-edge slant of over 2,000 feet; the height of the mountain will probably work out between 21,000 and 22,000 feet."

A notable excursion was made in 1899 by Messrs Freshfield and Garwood and Signor Sella entirely around the principal group of the Sikkim Himalayas, between the Teesta and Zemu rivers on the east and the Kangbachen torrent on the west, crossing the Jonsong-La (20,348), the story of which, illustrated by Sella's marvelous pictures, is told by Mr Freshfield in his "Around Kangchenjunga" (Arnold, London, 1903).

* See Climbing on the Himalaya and other Mountain Ranges, by J. N. Collie. Edinburgh, Douglas, 1902.

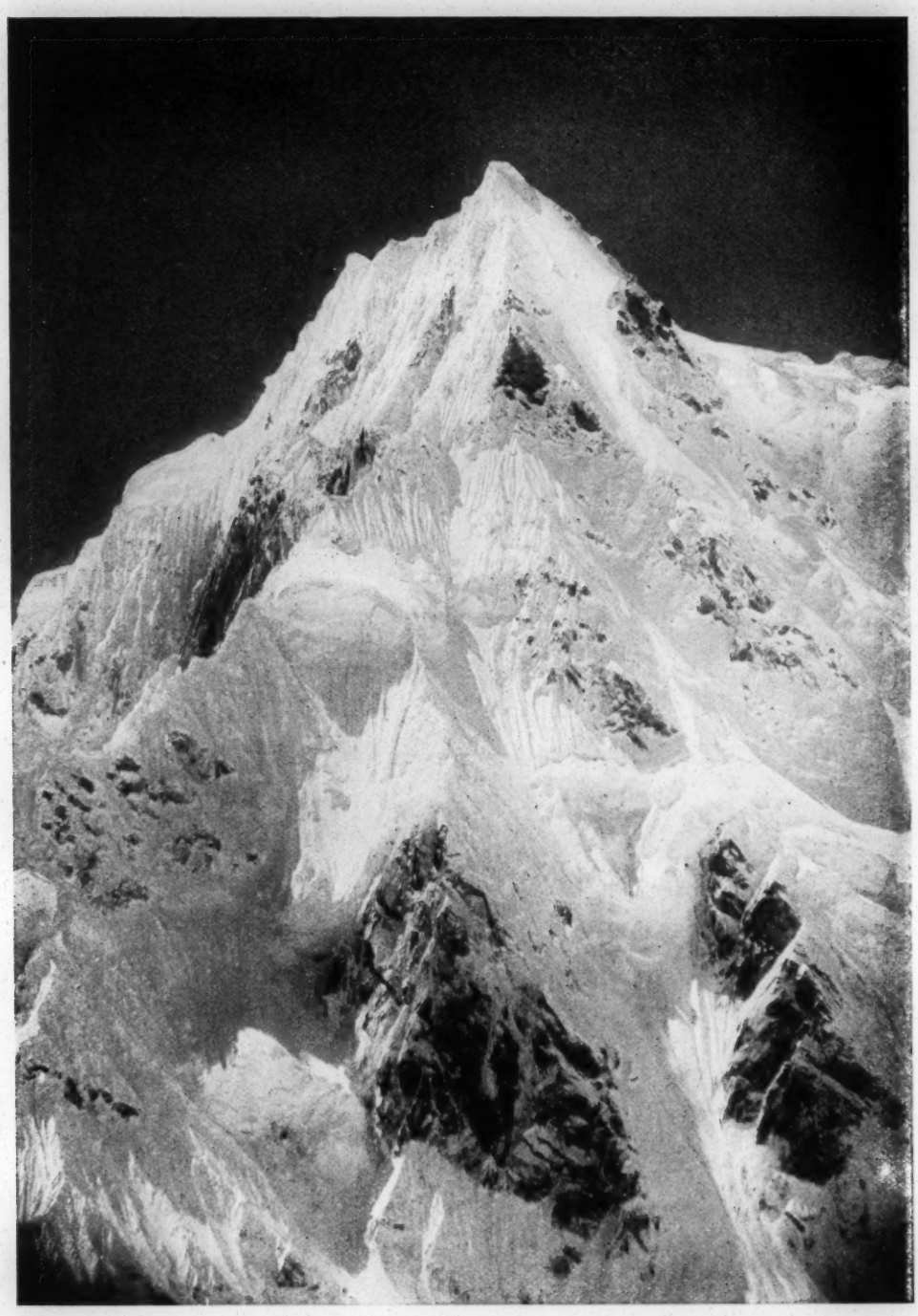
And finally we record the two events that gave a distinction to the year 1907, the jubilee year of the Alpine Club; the ascent, by Dr T. G. Longstaff, of Trisul (23,406), in the Garhwal, in which he made the remarkable speed-record (for such altitudes) of 6,000 feet in ten hours; and the ascent of Kabru (24,015), a "guideless climb" by two Norwegians,* C. W. Rubenson and Monrad-Aas, who disclaim "the distinction of being expert mountaineers," and, if we may take their word for it, are more pleased at the fact that they spent "twelve or thirteen days at a height of 19,500 feet and higher" than with holding the unchallenged record for farthest up. Their highest camp was at 22,600 feet, the loftiest elevation at which man has passed the night. They complain but little of the effects of rarefied air, and their feat would seem to remove every shade of improbability from the claim of the experienced Graham, who was accompanied in his climbs by one of the best Swiss guides of his day.

IN AMERICA

Returning now to the Western Continent, it may be in order to say a few words concerning the development of mountaineering as a sport on this side of the Atlantic.

That the proper temperament exists here is shown by the popularity of mountain clubs, the first of which, the so-called "Alpine Club" of Williamstown, Massachusetts, borrowed its name from its more distinguished predecessor as early as 1863, only seven years after the founding of the mother club so prolific in progeny. It, in turn, was the forerunner of the Appalachian Mountain Club (1876), which has at present some 1,600 members. This society has flourished in a region possessing no mountains that can lay the slightest claim to alpine characteristics, unless it be in the depth of a rigorous New England winter, when the broad-backed ridges of the Mount Washington range (4,000–6,300) simulate with

* See article "Kabru," by C. W. Rubenson, in Alpine Journal (182) for November, 1908.



Telephoto by Vittorio Sella

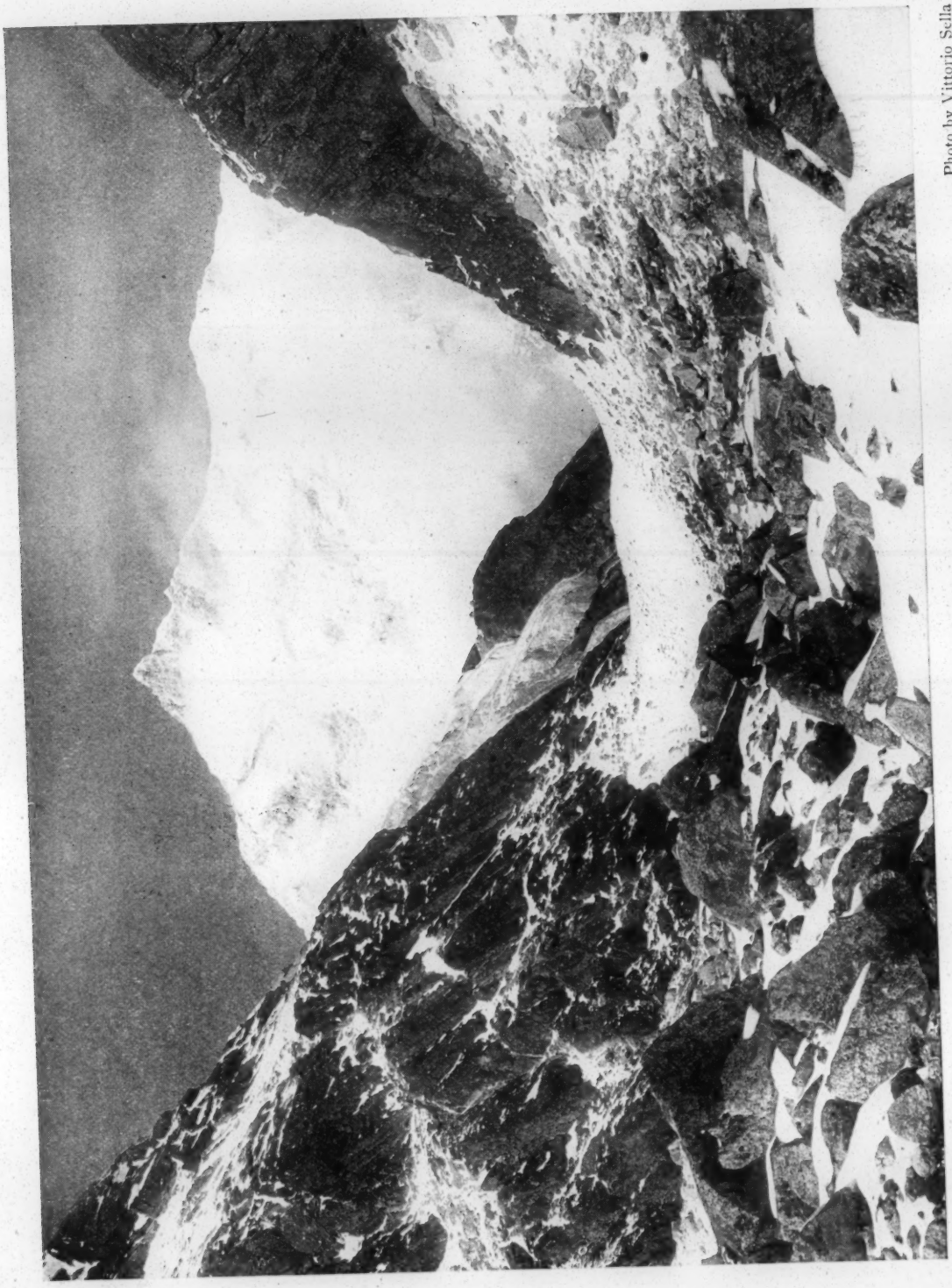
THE CREST OF SINIOLCHUM IN THE HIMALAYAS, 23,000 FEET

Regarded by connoisseurs as the most beautiful of snow peaks

Photo by Vittorio Sella

KANGCHENJUNGA, 28,150 FEET, THIRD IN ALTITUDE OF THE HIMALAYAS

The view on page 507 is taken from a point near the +



KANGCHENJUNGA FROM GUICHA LA (PASS), 16,430 FEET

Photo by Vittorio Sella

AMONG THE SMOOTH, BARE GRANITE CLIFFS OF THE SIERRAS ABOVE TIMBER-LINE Photo by G. K. Gilbert

their blanket of ice and snow the loftier summits of true alpine domes. Yet better evidence of our vocation is the distinction won by our fellow-countrymen and countrywomen in the most noteworthy climbing. Most of these eminent climbers are enrolled in the American Alpine Club (1902), a society of limited membership.

The Far West, and especially the Pacific slope of our continent, offers a much better field; yet even here, at least in the United States proper, distinctly alpine features are for the greater part absent. That vigorous societies have arisen here is not strange: the Sierra Club in San Francisco (1892) and the Mazamas (1894) in Portland, Oregon. The former finds a grand field for rock climbing in the High Sierra; the latter makes exhilarating and inspiring snow excursions to the summits of the extinct volcanoes of the Cascade Range. These beautiful snow-covered domes, Shasta (14,440), Hood (11,225), Saint Helens (10,000), Adams (12,470), and Rainier (14,394), present no serious technical difficulties, as may be judged from the fact that large parties of thirty to forty, of both sexes, not infrequently make their summits. This is not true of Mount Baker (10,827), which a selected party of Mazamas found almost beyond their powers in 1907. Moreover, the first ascent of Rainier in 1876 by General Hazard Stevens and his companion, both untrained in alpinism, was a noteworthy climb.

The first American work on mountaineering was Clarence King's finely told story of climbs in California, undertaken in the service of the State Geological Survey.*

The story grows exciting as the heroes cross some fearfully narrow arête; yet bolder climbs have been made since, until nearly every important peak has been scaled. Mount Ritter (13,156) was ascended by John Muir in the early seventies; Mount Whitney (14,499), the highest summit in the United States proper, by Bengole, Lucas, and Johnson in 1873, and Mount Abbott (13,700), whose "forbidding summit . . . is one of the only two great Sierra peaks which has not yet been ascended," (so wrote Professor J. N. Le Conte in 1907,*) was conquered in 1908 by that leading authority on the Sierra Nevada, to whose camera we owe our picture of its precipitous upper slopes.

While ascents in the Rocky Mountains, at least south of Montana, lack in interest, owing to the fact that even the most repellent summits usually have a very simple way of access, nevertheless the ascent of the Grand Teton (13,800) in Wyoming, made by Messrs Langford and Stevenson in 1872, counts among the most notable climbs of the early days, and there are doubtless some fine rock climbs yet to be made in the less-visited Sangre de Cristo Range, and perhaps in the Elk Mountains of Colorado.

The volcanoes of Mexico deserve mention less for their difficulty than for their altitude, since Ixtaccihuatl (16,500), Popocatepetl (17,660), and Orizaba (18,240) count among the highest peaks of North America. As with most mountains of their class, the demand is principally upon lungs and legs, the use of hands not necessarily entering into the problem, and each of the party may wander "at his sweet will." There being a sulphur mine at the crater of Popocatepetl, ascents may be assumed to be somewhat frequent. The "White Lady" of the more unpronounceable name is less accessible.† In the case of all these peaks it is of course difficult to say *quis primus*.

THE CANADIAN ALPS

It was with the opening of the Canadian Pacific Railway that a true American Switzerland was made accessible and a

* Mountaineering in the Sierra Nevada. Boston, Osgood & Co., 1864. New edition. Scribners, 1901.

* Alpina Americana No. 1, The High Sierras of California, Philadelphia, 1907.

† An interesting account of a recent ascent made by Mr Charles A. Gilchrist (A. A. C.), of Philadelphia, may be found in Appalachia, Vol. X. Ascents of Popocatepetl and Orizaba, by A. E. Douglass and W. A. Cogshall, were described in Vol. VIII of the same journal.

new era began for cis-Atlantic alpinism. Though rising but from 9,000 to 12,500 feet above sea-level, the highest summits spring from 5,000 to 8,000 above their bases, which, after all, for the climber is the true criterion of height. They bear extensive glaciers with intricate ice-falls and, with their manifold architecture, present every variety of climbing to be found in the Swiss Alps. Mr Green's visit of 1888, to which we have referred, was followed two years later by that of Herren E. Huber and C. Sulzer, of the Swiss Alpine Club. Mr H. W. Topham, of the English club, was also on the ground. Their excursions were confined to the Selkirks, where interest first centered. Huber and Sulzer together climbed Sir Donald (10,808), Sulzer took in Swiss Peak (10,515), and Huber and Topham Purity (10,457) and other peaks beyond the Asulkan Pass. Like Green, they brought no guides and depended for porters on what the country had to furnish.

Two recently graduated Yale men, S. E. S. Allen and W. D. Wilcox, then became interested in the more easterly range of the Canadian Rockies, and as early as 1903 began their series of visits, in which they explored several of the less-known valleys, climbing in 1904 Mount Temple (11,626), the ponderous and impressive mass towering above Laggan. Mr Wilcox is an expert photographer, and the beautiful results of his camera illustrate his two books on that region.*

In 1905 a delegation of three members of the Appalachian Mountain Club—Abbott, Fay, and Thompson—made their first serious attack on these peaks, capturing Mount Hector (11,125) in the Rockies, and Castor and several minor peaks in the Selkirks, reconnoitering also for the ascent of Mount Lefroy (11,220). Joined by Professor Little, in 1906 they returned. Three of the party captured Mount Rogers (10,536), and then the four proceeded to renew the attack on Lefroy. In this attempt the valuable life of Abbott was sacrificed. This was in the days before the coming of expert guides.

In 1907 an Anglo-American party of nine, with the Swiss guide Peter Sarbach, brought over by the British members, made the successful ascent of Lefroy. Two days later three of the company and the guide made Victoria (11,355), and some days thereafter Mount Gordon (10,336) was climbed by the entire party. In the number were men who had climbed in many lands, among them Professor Collie, of the ill-starred expedition to Nanga Parbat. In the climb of Mount Gordon a noble mountain was sighted, and as a memorial to his lost companion named Mount Mummery (10,908).

That Collie found here a region answering all demands was proven by his repeated visits, during which he explored a wider field than most of his contemporaries, ascending, among other peaks, Athabasca (11,900), Freshfield (10,900), Forbes (12,075), The Dome (11,650), Diadem Peak (11,500), and Murchison (11,100).* It was he also who first called attention to Mount Columbia (12,740), the highest conquered summit of the Canadian Alps, the unsuccessful goal of his second visit. In two of his expeditions he was accompanied by H. Wooley, of Caucasian fame. Doctor Collie's expeditions are interestingly narrated in the book already referred to and a later publication.†

The year 1907 also brought hither the late Herr Jean Habel, fresh from explorations at the base of Aconcagua, who in this visit discovered and revealed the beauties of the now well-known Yoho Valley, and in 1901 pushed his explorations northward to the base of Mount Columbia. Our picture of this beautiful pyramid is from his camera.

In 1899 Parker and Fay, with the Swiss guides Häsler and Feuz, made the summit of Mount Dawson (11,113), one of the highest of the Selkirk range.

*Camping in the Canadian Rockies, 1896 (Putnam); The Rockies of Canada, 1900 (id.).

* This series of altitudes is approximate.

† Climbs and Explorations in the Canadian Rockies, by J. N. Collie and H. Stutfield, Longmans, 1903.

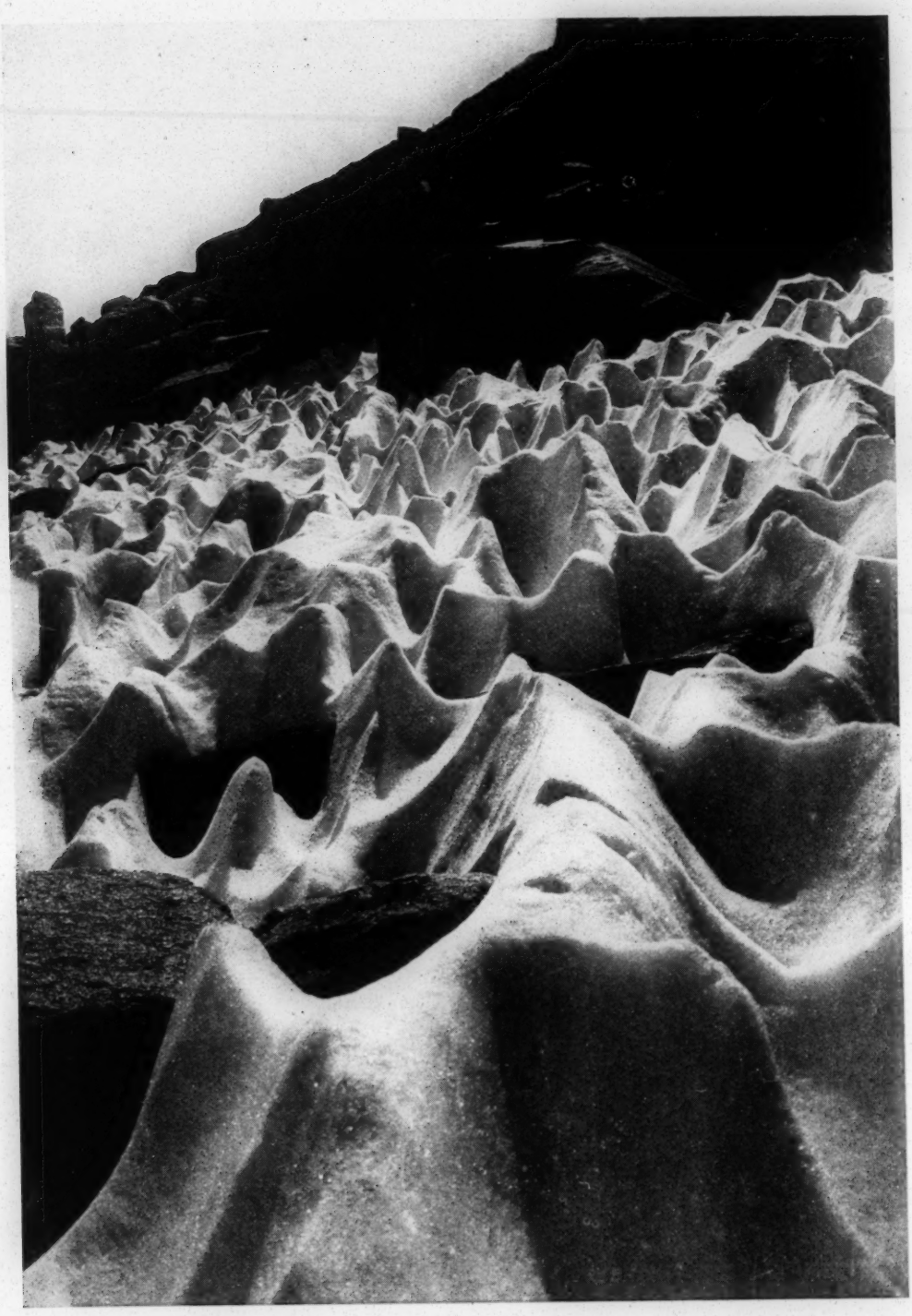


Photo by G. K. Gilbert

A WASTING SNOWDRIFT IN THE SIERRAS

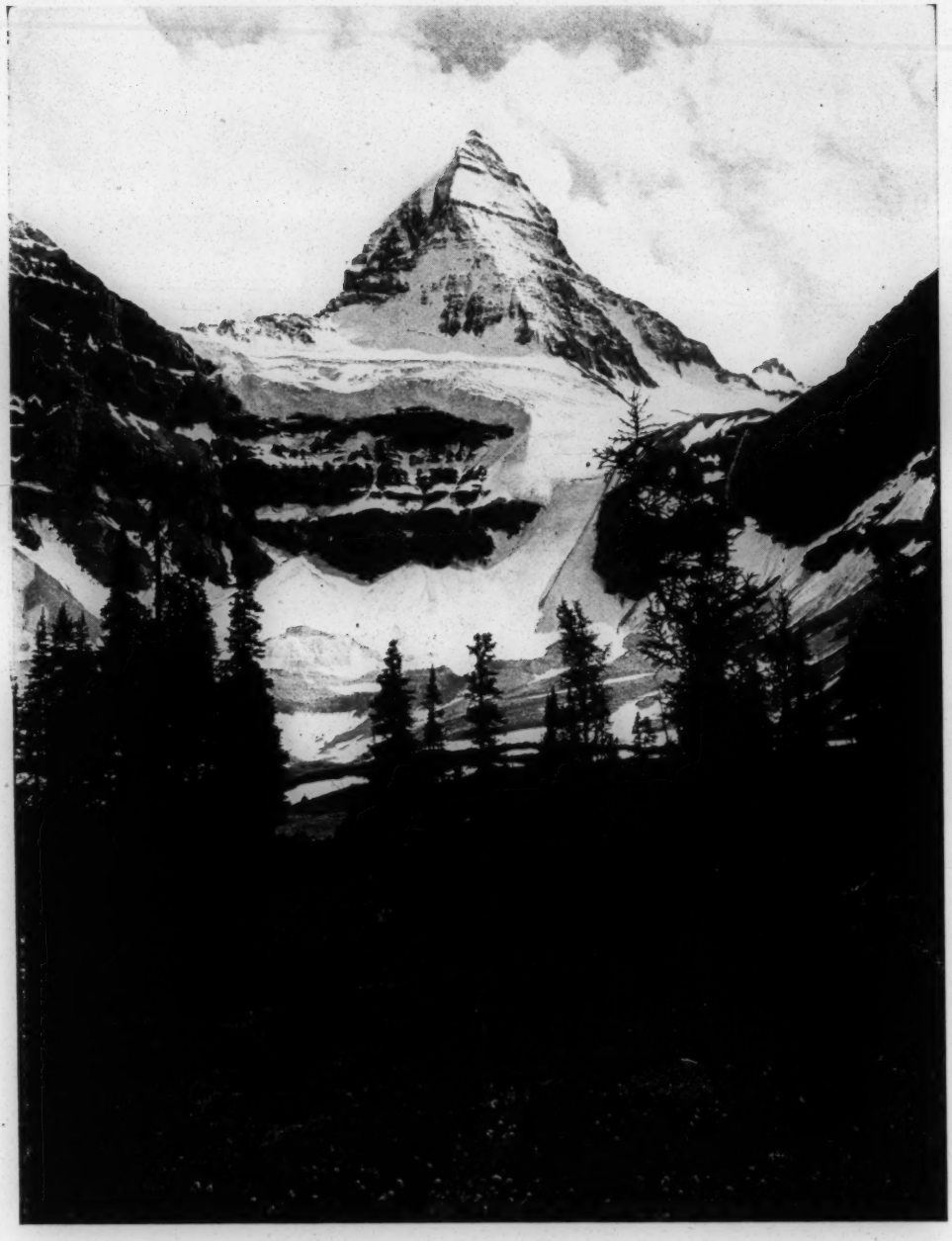


Photo by Walter D. Wilcox

A CANADIAN MATTERHORN, MOUNT ASSINIBOINE

Nearly 12,000 feet high; first ascended by James Outram in 1901

The year 1901 saw the first of a series of visits from Edward Whymper, the conqueror of the Matterhorn and Chimborazo. Though he made no ascents of the first order, he was by no means idle, visiting many heights and some secluded valleys, collecting much interesting data. That year also brought for the second time another British climber, of a very strenuous type, whose appetite had only been whetted by a hasty visit in 1900. Mr James Outram's record is not likely soon to be surpassed. It includes for 1901 Cathedral (10,454), Assiniboine (11,860), Vaux (10,881), and the Chancellor (10,751), the last two with companions. In 1902, in a single campaign, with only the guide Christian Kaufmann, he secured the summit of Alexandra (11,650c.), Bryce (11,686), Lyell (11,950), and Columbia (12,750), and in conjunction with Collie's party, Mount Forbes (12,075).

The principal victories of 1903 were won by climbers from the United States, Parker and Fay securing the south peak of Mount Goodsir (11,676), which asserts some claim (until a more accurate measurement is made of Mount Assiniboine) to be the highest Canadian peak south of the railway. Later Parker and Eggers conquered Hungabee (11,447), Deltaform (11,225), and Biddle (10,500), three of the most forbidding peaks of the Canadian Alps.

In 1906 our cousins beyond the boundary became impressed with the long neglect of their splendid opportunity and formed the Alpine Club of Canada, which has made a phenomenal growth under the presidency of A. O. Wheeler, Esq., the government topographer for that region, who, as likewise his professional associates, has a long list of first ascents to his credit.

THE TIAN SHAN RANGE

Contemporaneously with the most active work in the Canadian Alps, the first survey was being made in a little-heard-of-range of gigantic snow peaks—the Tian-Shan range, in the very heart of Asia—by Herr Merzbacher, whose name we have already mentioned in connection with the Caucasus. Recognizing the absolute necessity of an alpine equipment, he took with him expert guides, and in the course of his explorations climbed several peaks between 13,000 and 17,000 feet and passed around the *massif* of Khan-Tengri (23,600 c.). As this peak is almost exactly on the same parallel as Boston, one may judge that it towers far above the line of perpetual snow. The peculiarly dry powdery character of the snow at the higher levels rendered progress very difficult and dangerous, exciting serious doubts as to the possibility of ever reaching the highest summits.

THE ANDES

It was in the late nineties also that attention was called afresh to the Andes, where in 1879-80 Mr Edward Whymper the first to climb the Matterhorn (1865) and to produce a true classic on mountaineering, had won new fame. Mount Chimborazo (20,498) was his chief objective point, and his confessed motive to investigate the effect of high altitudes upon the human organism. Humboldt in 1802 had ascended to above 19,000 feet, just to the place where some knowledge of the climber's craft was requisite for further advance. A generation later, in 1831, the French naturalist, Boussingault, had reached apparently the same turning point. Carefully making his preparations, accompanied by his favorite guide, Carrel, and a Swiss porter, Mr Whymper betook himself to the high table-land of Ecuador. In the course of his expedition he ascended, measured, and mapped not only Chimborazo, but also the active volcano Cotopaxi (19,613), Antisana (19,335), Cayamba (19,186), and several other peaks over 15,000 feet high. Employing his unusual powers of critical observation in many directions and bringing home data from various fields, he published the results in a notable work,* which stands as an unsurpassed model of its class.

* Travel among the High Andes of the Equator, 2 vols. London, John Murray, 1892.

Lofty as are these equatorial colossi, still greater peaks of undetermined height were known to exist further south, and it was to these the alpinists from different lands now began to turn their steps. Here the names of E. A. Fitzgerald and Sir Martin Conway acquired new distinction. In 1897 the former assaulted Aconcagua (23,080), the generally conceded culmination of the system. Though personally compelled by sickness to desist from each of his efforts to reach the summit, nevertheless members of his party, Mr S. Vines and the guide Zurbriggen, accomplished the ascent. Later Fitzgerald, with companions, climbed Tupungato (21,550). In 1898 Conway captured Illimani (21,192) and made a speedy second ascent of Aconcagua, but was turned back on Illampu (Sorata) when within, as he estimated, some 250 feet of the summit. Doubtful of the correctness of the accepted measurement of this peak (24,812 feet, according to the Bolivian survey), even though his own barometric determination plus his estimate came out but a few hundred feet less, he made a careful trigonometric survey, which resulted in lowering the peak to 21,700 feet!

Meanwhile a woman of our own nation was making her practice climbs in the Swiss and Tyrolese Alps and in Mexico, in preparation for bold attempts upon these much-talked-of giants of the Andes. First in 1903, accompanied by two Swiss guides and a scientific assistant, she attacked Mount Sorata, but was compelled to retire discomfited. Returning the following year, this time without guides, and hence compelled to take as her companion a gentleman of quite limited alpine experience found on the spot, she pluckily went forward and from a camp at 18,100 feet attained an elevation estimated at "approximately 20,500 feet, probably within 600 or 800 feet of the summit." Becoming persuaded that Mount Huascaran (Huascan), in Peru, was actually the highest peak of the Andes, to attempt this she returned to South America in 1906, again without guides and again to meet with failure. Undaunted still, and able this time to associate in her enterprise the aid that even the most expert alpinists regard as indispensable, she made another attempt in 1908, in which her long and persevering efforts were crowned with success. It is to be regretted that she secured no hypsometric reading at the summit of Huascaran, which is not generally recognized as holding so prominent a place as Miss Peck accords to it—"estimated 23,800–24,000 feet and perhaps higher." Instructed by Sir Martin Conway's test of Illampu, all mountain lovers will await with interest a scientific determination of the altitude of this grand peak, meanwhile according Miss Peck a very high place among those who have attained the loftiest altitudes and the first prize for persistence and energy.

ALASKA

Allusion has already been made to the conquest of Mount Saint Elias by the Duke of the Abruzzi, which occurred in 1897—the same year with the first ascent of Aconcagua. Between 1886 and 1891 four serious attempts had already been made to scale this peak, with varying degrees of insuccess. Its remoteness from civilization in a sub-arctic waste, its whole altitude practically above snowline, made it an inviting substitute for an Himalayan goal when the breaking out of the plague in India turned the mind of the young explorer from a proposed attempt in that section. Less as an ascent difficult *per se* than as a most skillfully arranged campaign, and as a training school for its leader in preparation for the arctic expedition which shortly was to win for Italy the temporary record for "Farthest North," does this ascent take a place among the most important. The story is told so fully by Doctor De Filippi in his interesting narrative* that it is unnecessary even to outline it here. We cannot, however, forbear to remark upon the graceful recognition accorded to the remarkable work of Professor I. C. Russell, of the University of Michigan, who in 1890, and again in 1891, though prac-

* The Ascent of Mount Saint Elias. Westminster, A. Constable & Co., 1900.

Photo and copyright by Annie S. Peck

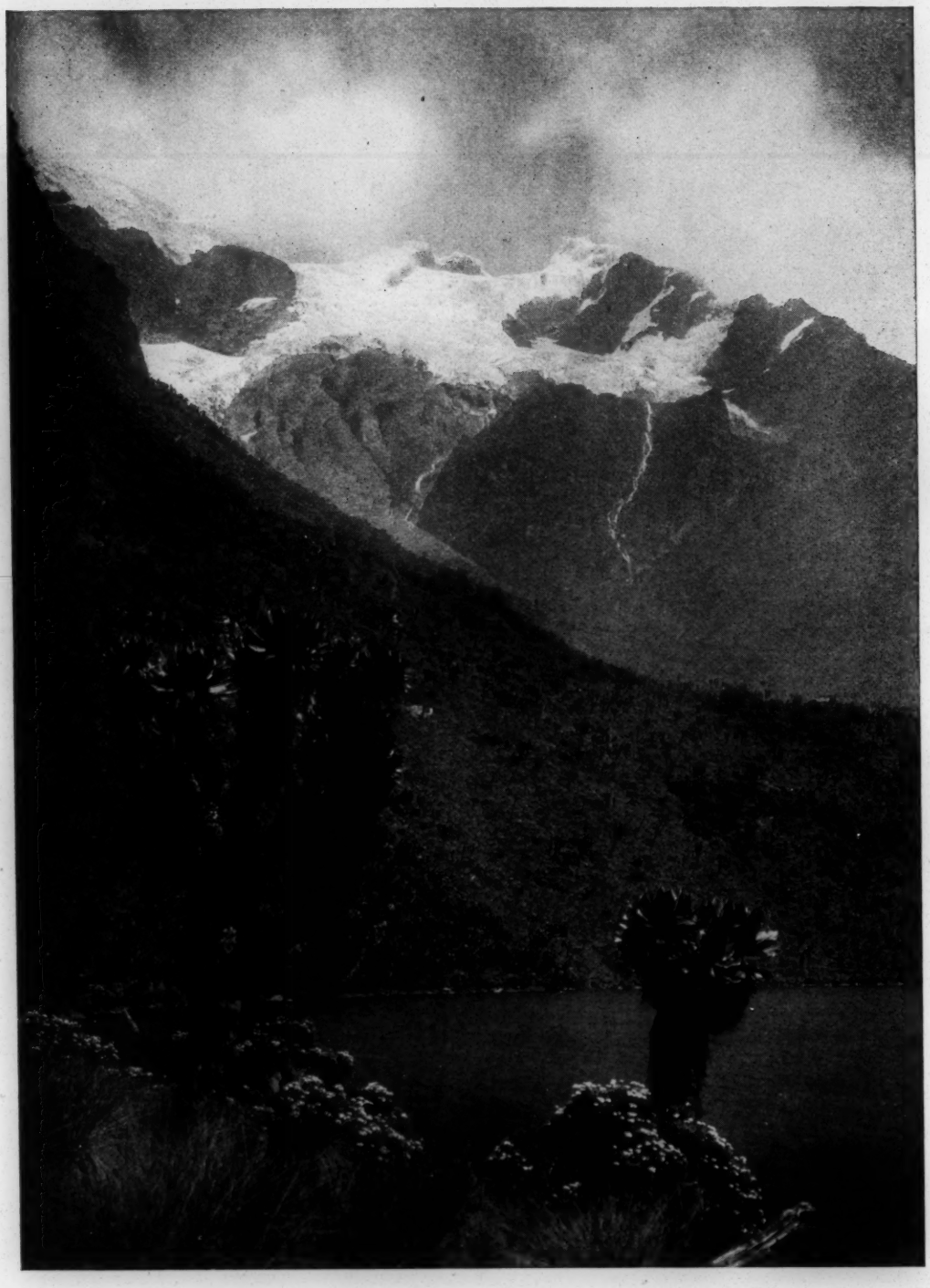
HUASCARAN, PERUVIAN ANDES, FROM AN ELEVATION OF ABOUT 10,000 FEET

tically untrained in alpinism and without guides, had pushed forward almost to within reach of the prize, camping finally at the high point where the Italians passed their last night before success and to which they later gave the name of Russell Col. This climb of Russell would still rank as the most daring feat of American mountaineering had it not recently been surpassed upon a peak yet farther north.

This distinction must, we believe, be accorded to the ascent of Mount McKinley by Dr Frederick A. Cook, of Brooklyn, with a single companion, in 1906. The details are thus summarized in *Appalachia*, though the narrative is given in full by the author in his "To the Top of the Continent."

"A mountain near to the Arctic Circle rising to an elevation of over 20,000 feet, nearly its entire mass above the snow-line of its region; a wild and difficultly accessible region this, approachable along glacial rivers by a novel accessory for mountaineering, the steam launch, and by pack train under unusual disabilities; two failures to find a line of ascent, compelling the party to desist from present effort and tantamount to the postponement of the enterprise to another year; then a party of three men set out for surveying purposes, bearing on their backs their entire outfit for a fortnight: provisions, camp, clothing, and liquid fuel for high altitudes; this reconnaissance brings them to the summit of a subordinate ridge, from which a natural route to the summit seems open; two of the party attempt it; neither is trained in alpine climbing, though the leader is experienced in arctic work; to this they trust, and with dogged persistence, living upon pemmican, dispensing with fire save for tea-making, they toil upward for four days, now building an Esquimaux igloo for the night where a level space will permit, again digging a cavity on the side of a precipitous snow slope and enduring the rigors of the arctic cold, protected only by their sleeping bags—and the Providence that stayed the avalanches that might have overwhelmed them—until the summit is theirs!"

It may be doubted whether the entire history of mountaineering affords a more remarkable story of combined audacity and persistency or of strenuous toil and



AFRICA'S MOST FAMOUS MOUNTAIN, RUWENZORI Photo by Vittorio Sella

The highest summits, Peaks Margherita and Alexandra, are here seen from the south rising above Lake Bujuku, itself 12,850 feet above the sea. Giant senecios in the foreground. (See pages 256-264, March, 1909, NAT. GEOG. MAG., for a further description of this noted peak.)

endurance, though it may be admitted that here, as in the case of Mount Saint Elias and of Kabru, there were no serious technical difficulties.*

RUWENZORI

Almost simultaneously with the departure of Doctor Cook's party for the second attack on the loftier compeer of Mount Saint Elias, the conqueror of this peak was setting out upon a task of greater difficulty under conditions almost diametrically reversed—the ascent of Mount Ruwenzori, the snowy source of the Nile, rising almost upon the Equator. Here also several previous attempts had been made, both by explorers and alpinists. The more successful of these had set foot on the glaciers, yet none had reached a point sufficiently high, or with weather clear enough, to overlook the region and bring back satisfactory topographical data. Here again careful preliminary arrangements, adequate resources, and perfect discipline were crowned with a brilliant success. The mystery of these till recently unheard of mountains—though there seems little doubt that they are the "Mountains of the Moon" of Ptolemy (A. D. 151)—has now been completely dispelled, and the map shows even intimate details of their somewhat complicated topography; for Ruwenzori is not a mountain, but a group of six connected *massifs*, each rising in several peaks and all crowned with eternal snows. These are fourteen in number, of which nine range between 15,800 and 16,815 feet, and are therefore higher than Mont Blanc.

Leaving the shore of the Indian Ocean at Mombasa on May 4, the party made the quickest possible passage through the fever-breeding country by rail and by steamer on Victoria Nyanza to Entebbe, on its northern shore. With an army of 220 porters and yet other attendants, they proceeded by short stages of fifteen miles a day to Fort Portal (218 miles), the capital of the Protectorate of Uganda, the farthest outpost of civilization. Rising stage by stage, no longer by roads but by trails up slippery hillsides and over timbered ridges and rushing streams, amid strange, weird tree-growths, and with the wild beasts of the jungle sometimes in evidence, they came at length to their permanent camp, Bujongolo (12,350), a comfortless place under the inhospitable shelter of an overhanging cliff, distilling the ever-condensing fogs of long days of rain. Here a hardier race of negro porters, took the place of those from the lowlands. From here the numerous excursions set out.

Of the eighteen summits of the six *massifs* that form Ruwenzori fourteen, including all the highest ones, were ascended by the Duke of the Abruzzi and his guides, followed later by the smaller parties in several instances. Vittorio Sella made nine ascents of six summits, and procured the superb series of photographs which make the printed narrative* one of the most beautiful of recent alpinistic contributions to geographic literature. The six *massifs* were named for leading African explorers, the name of Stanley being given to the one bearing the highest peaks. On Stanley there are five summits, to the two loftiest of which were given the royal names of Margherita and Alexandra. A large amount of data with regard to topography, geology, mineralogy, meteorology, and botany was collected and forms a compendious appendix to the story. This brilliant campaign required four months for its execution, and though the fever compelled the dropping out of one of the party at Mombasa and detained Captain Cagni for two weeks at Entebbe, so far as appears no life was sacrificed during the expedition.

ALPINE ACCIDENTS

Indeed, in this story of the world's most notable ascents, conducted largely in inaccessible regions and under extraordinary conditions, we have had occasion in but three instances to allude to

* A superb series of illustrations of Alaska's mighty peaks will appear in the July number of this Magazine.

* Ruwenzori. New York, E. P. Dutton & Co., 1908.

Photo by G. P. Abraham

VIEW FROM NEAR THE SUMMIT OF THE MATTERHORN, SHOWING DENT D'HERENS, MONT BLANC, ETC.

The actual summit is the crag on the right

SASS MAOR, IN THE TYROLESE ALPS

Photo by Vittorio Sella

Though but 9,240 feet in altitude, its limestone precipices furnish a very difficult climb. First made in 1875

Photo by G. P. Abraham

THE BERGLI HUT (9,745 FEET), IN THE BERNESE OBERLAND

This refuge affords a superb view of the Schreckhörner, Wetterhorn, etc.

fatal accidents. In view of the pitiful and mortifying list of fatalities annually occurring in the Alps, this comparative immunity is suggestive. While the most skillful mountaineers may meet with unforeseen and unpredictable disaster, it is not this class which usually furnishes the victims. Again these larger enterprises are undertaken with deliberation and carried out with judgment. Time is an important factor and generously allowed; hence the dread of today's failure does not disturb serenity nor stimulate to rashness. Athletic *tours de force* are not attempted, though, after due weighing of risks, serious difficulties are met and overcome.

The conditions, therefore, are quite different from those which attended two of the most notable of accidents, that of Mr Whymper's party in the first ascent of the Matterhorn, in 1865, and the terrible one on the Dent Blanche, in 1899. In the former the party, already too large for safety, contained a novice, whose unnecessary slip at a critical moment on the descent hurled the chief guide from his footing and dragged two others after them to their death. The breaking of the rope alone saved Mr Whymper and his two guides.

In the other case, a notably rash climber with skilled companions was ascending one of the most difficult mountains by its most difficult (west) arête. Standing supported upon an ice-axe held by those below him, shortly below the summit, the chief guide slipped, fell, and dragged down to death three others. The rope, made fast about a rock above the last man, broke, leaving him alone to make the perilous traverse over the summit and to suffer a thousand deaths in the awful two days and nights that elapsed ere he dragged himself at length, exhausted and famished, to a place of

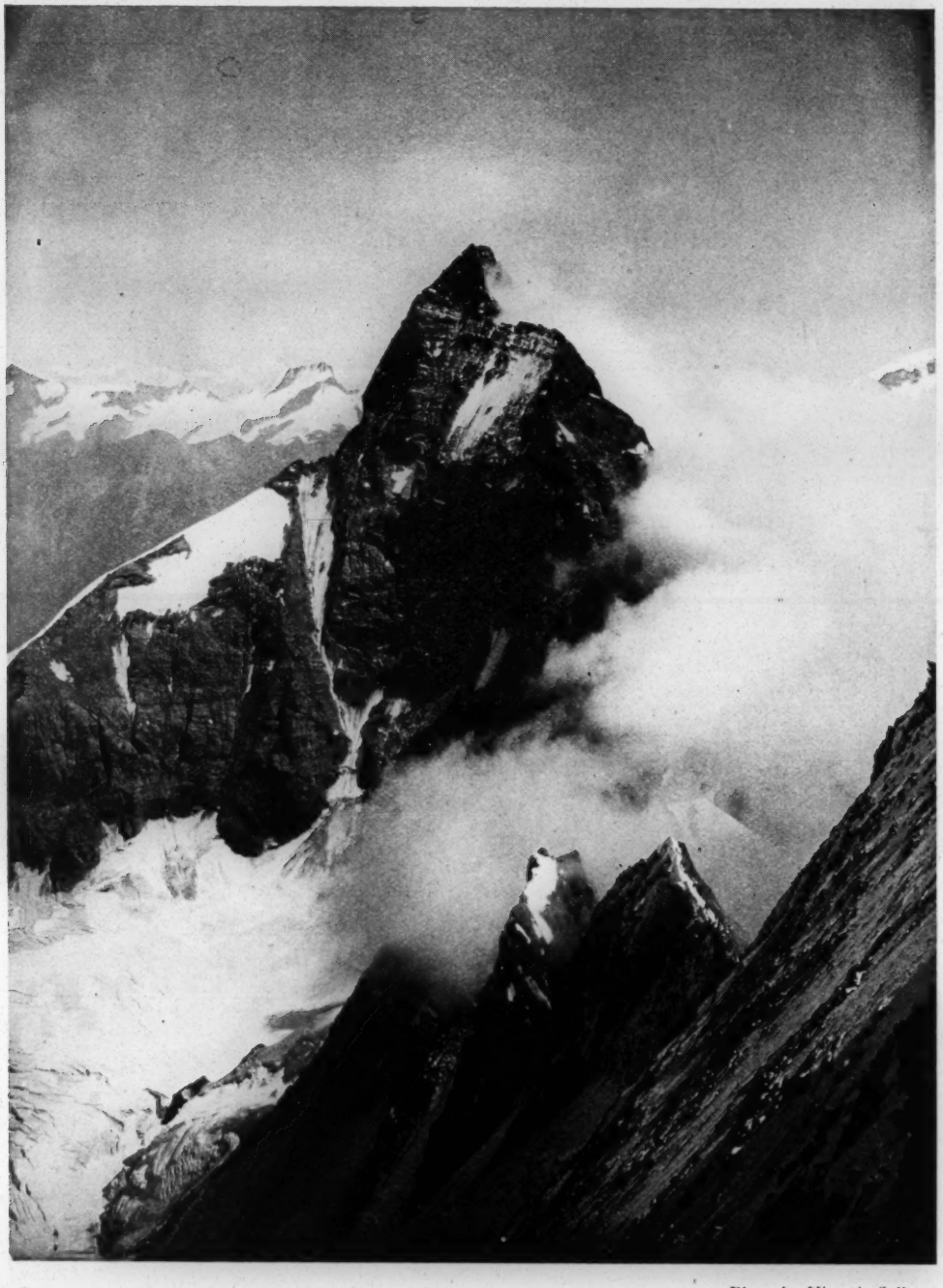
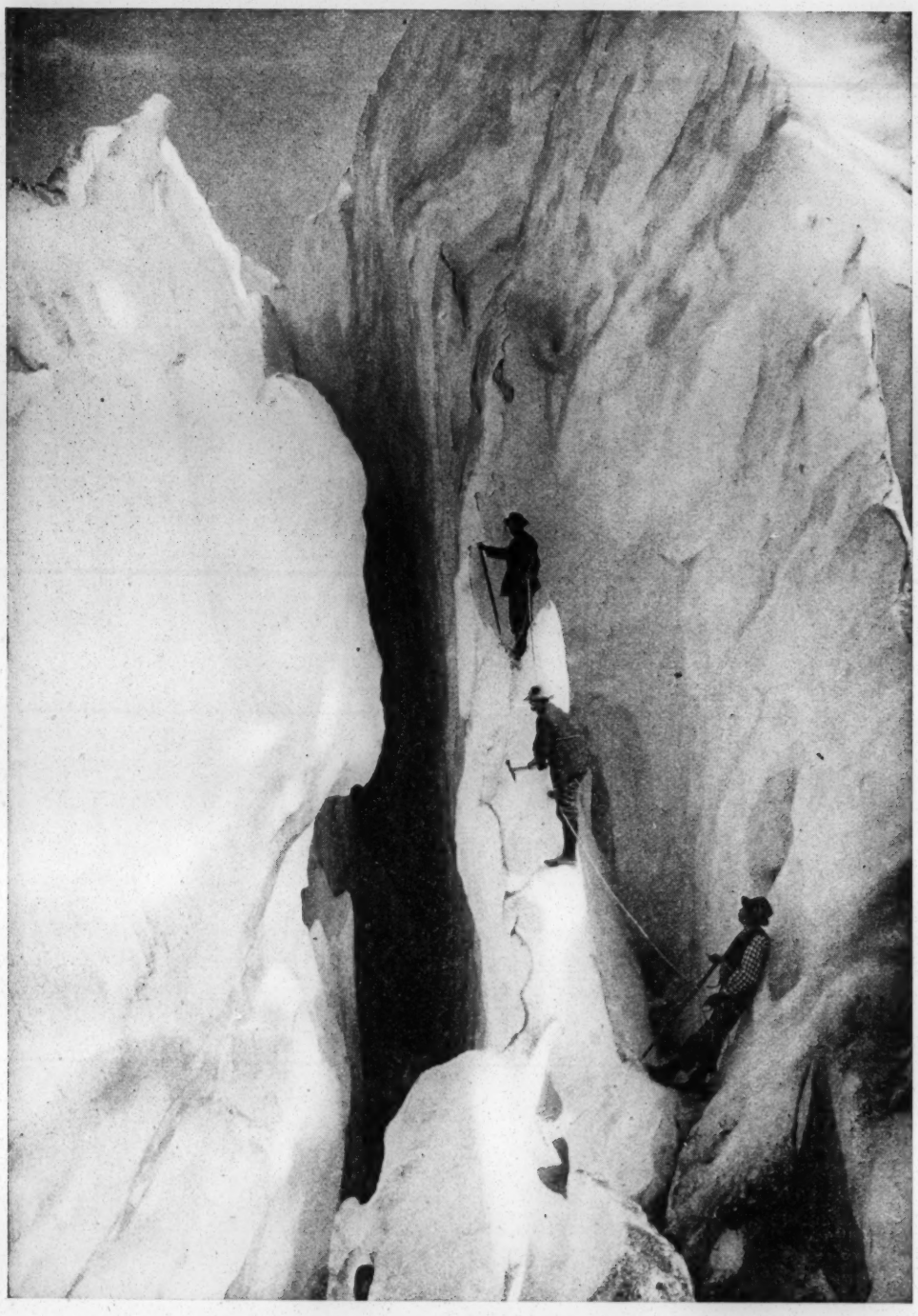


Photo by Vittorio Sella

THE MATTERHORN, SHOWING ON THE LEFT THE ZMUTT RIDGE, WHICH AFFORDS THE MOST DIFFICULT OF THE ASCENTS OF THIS NOTED PEAK



A CREVASSE FROM BELOW THE BERGLI HUT Photo by G. P. Abraham

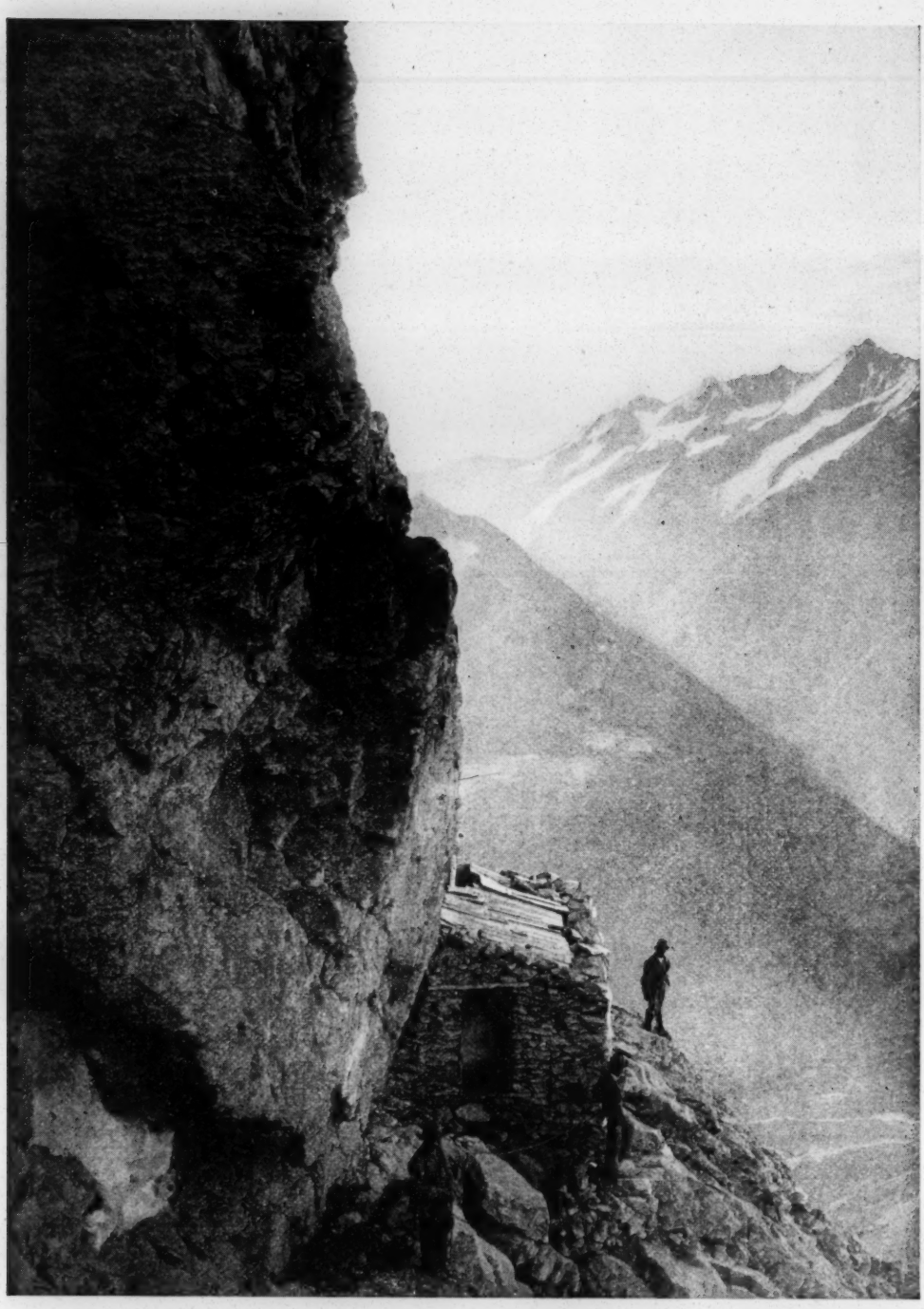


Photo by G. P. Abraham

THE OLD "CABANE" ON THE EAST FACE OF THE MATTERHORN AT 12,526 FEET ABOVE THE SEA

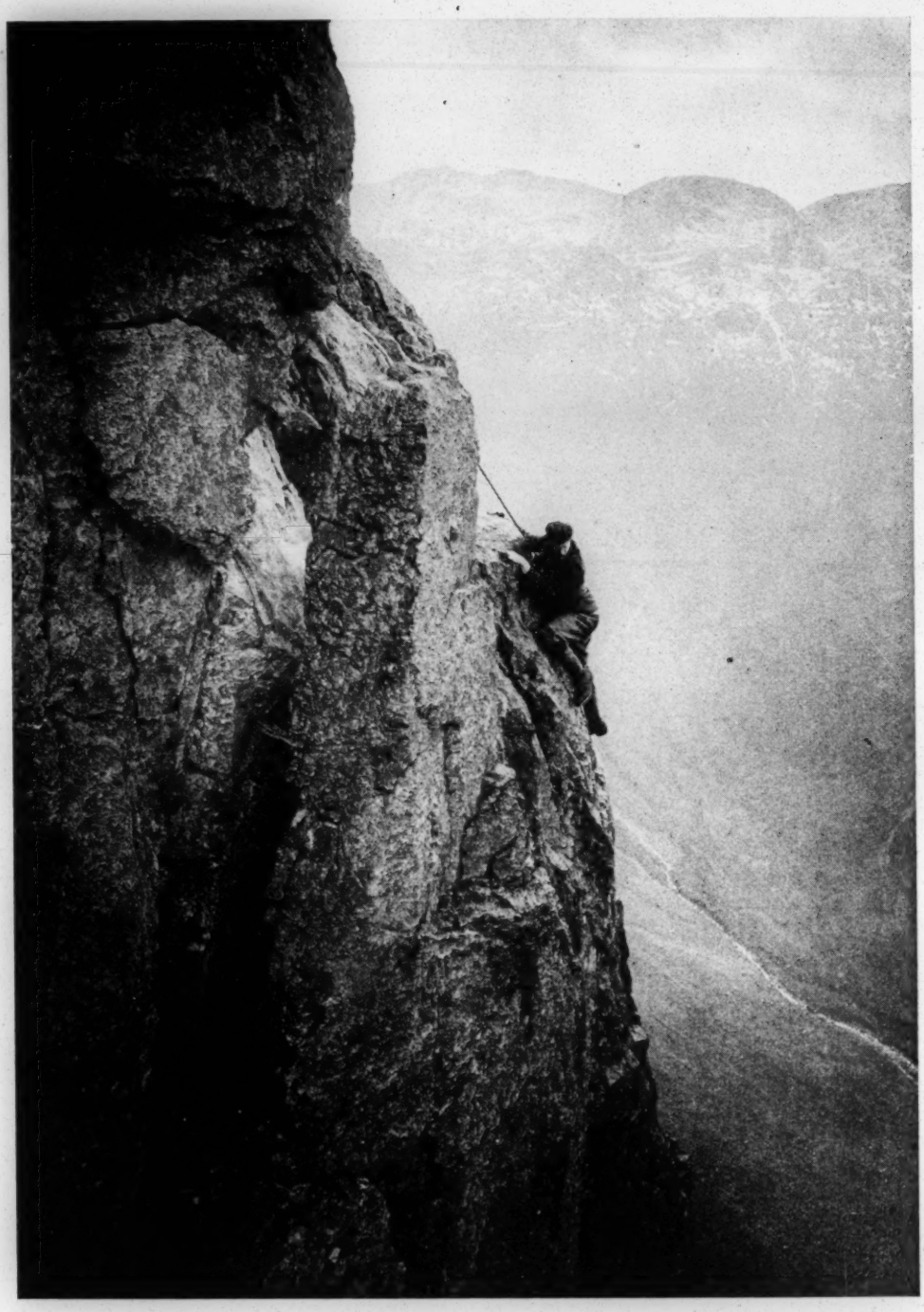
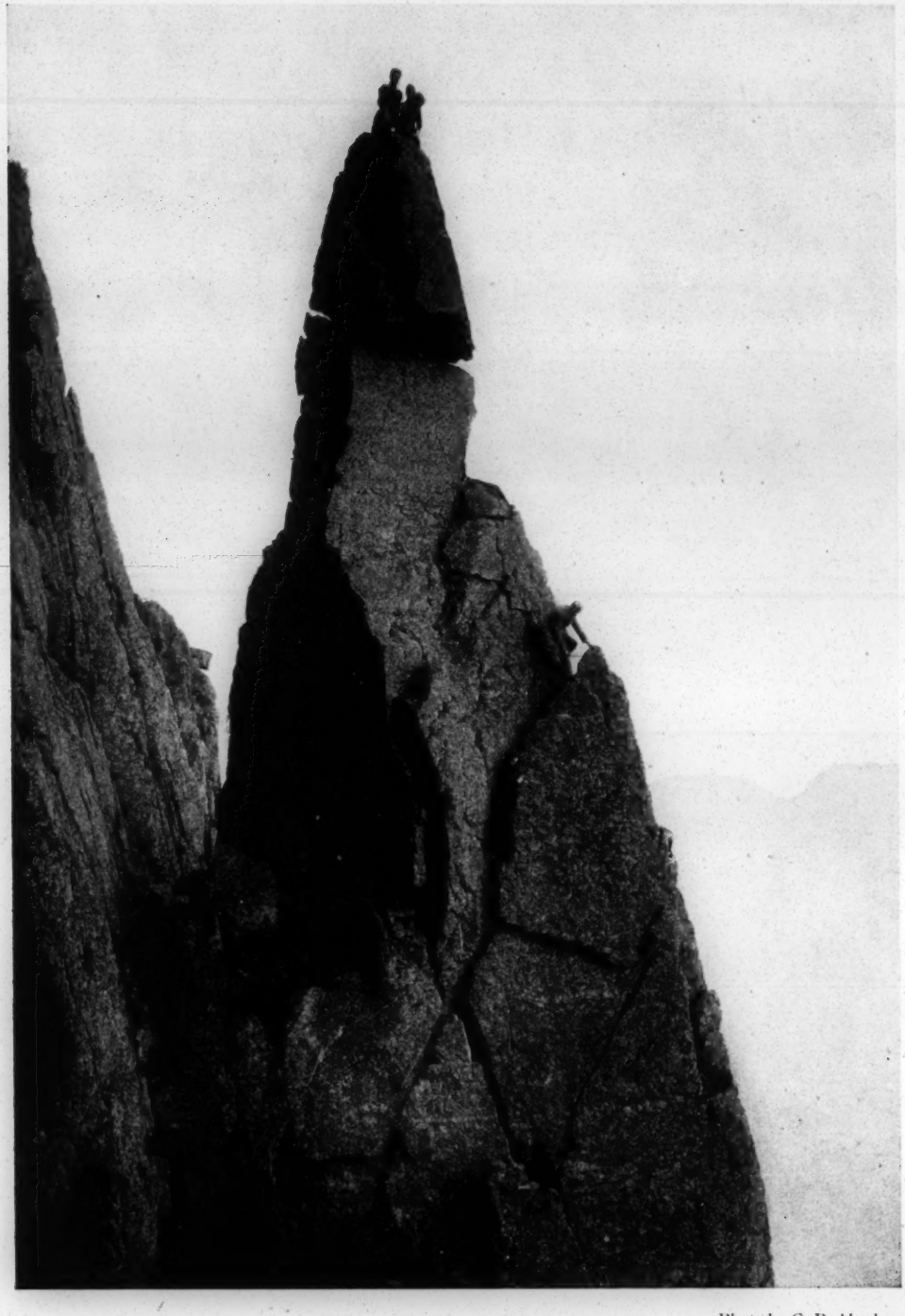


Photo by G. P. Abraham

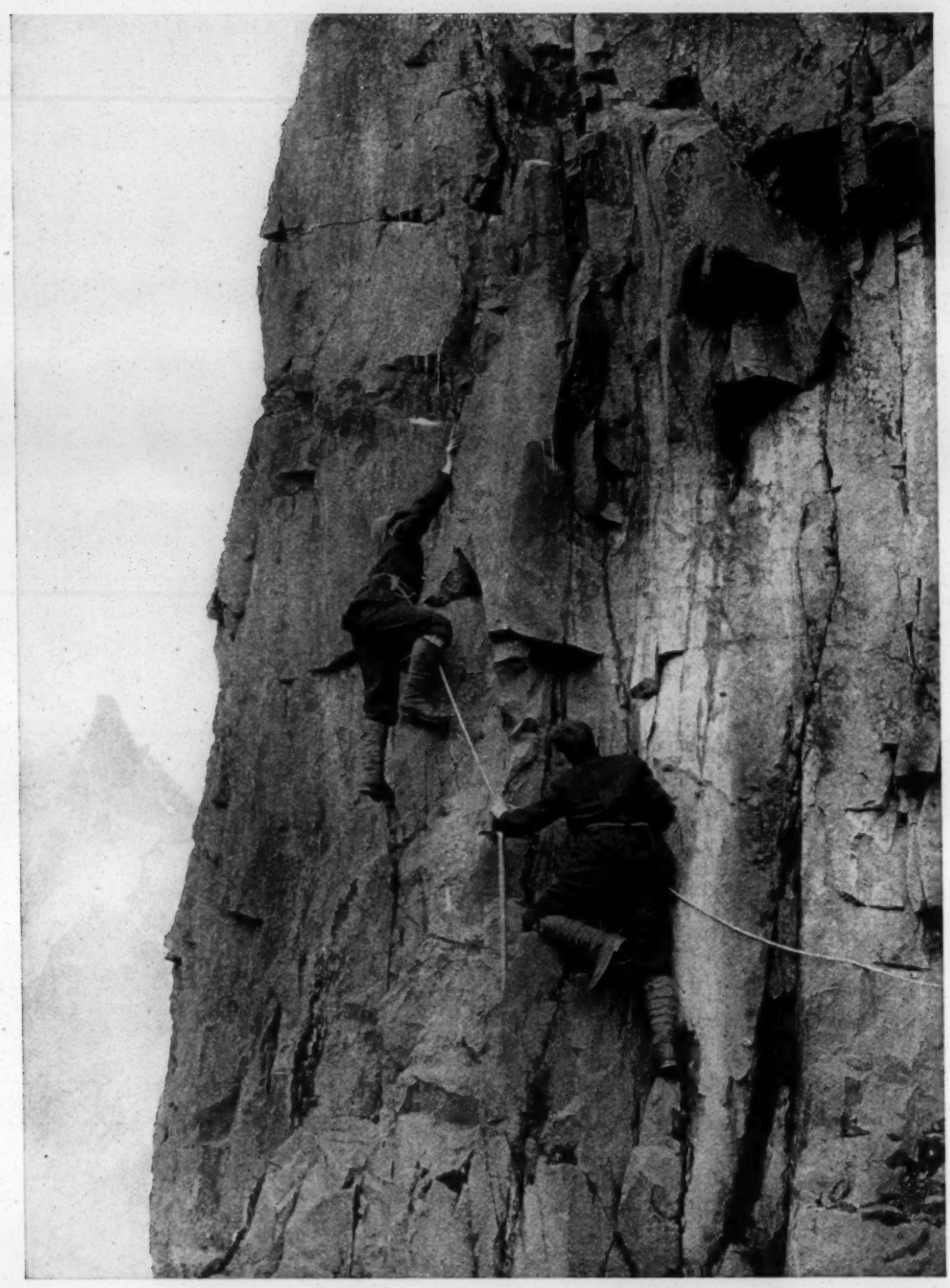
THE "EAGLE'S NEST," THE MOST DIFFICULT ROUTE TO THE GREAT GABLE

This and the following view represent very difficult rock climbing in the Lake District of England, the training ground of some of her most expert cragsmen



THE NAPES NEEDLE, GREAT GABLE Photo by G. P. Abraham

Climbed by Haskett Smith, alone, in 1886. "One of the most daring things that have been done in the Lake District," so reported by Owen Glynn Jones, who perished on the Dent Blanche in 1899.



ON THE TRAVERSE OF THE GRÉPON Photo by G. P. Abraham

An episode in one of the most difficult climbs among the Chamonix Aiguilles. First ascended in 1881 by A. F. Mummery

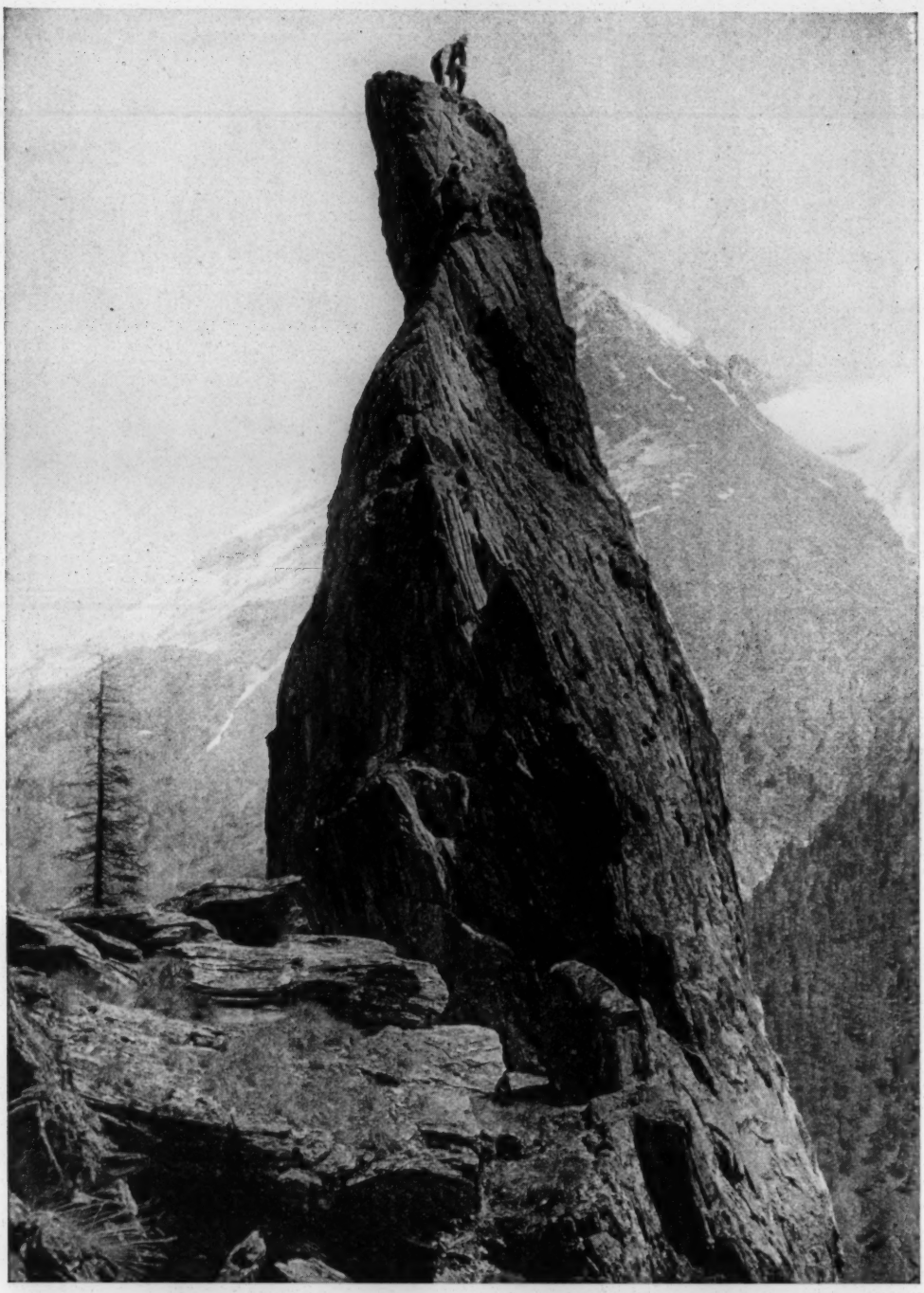
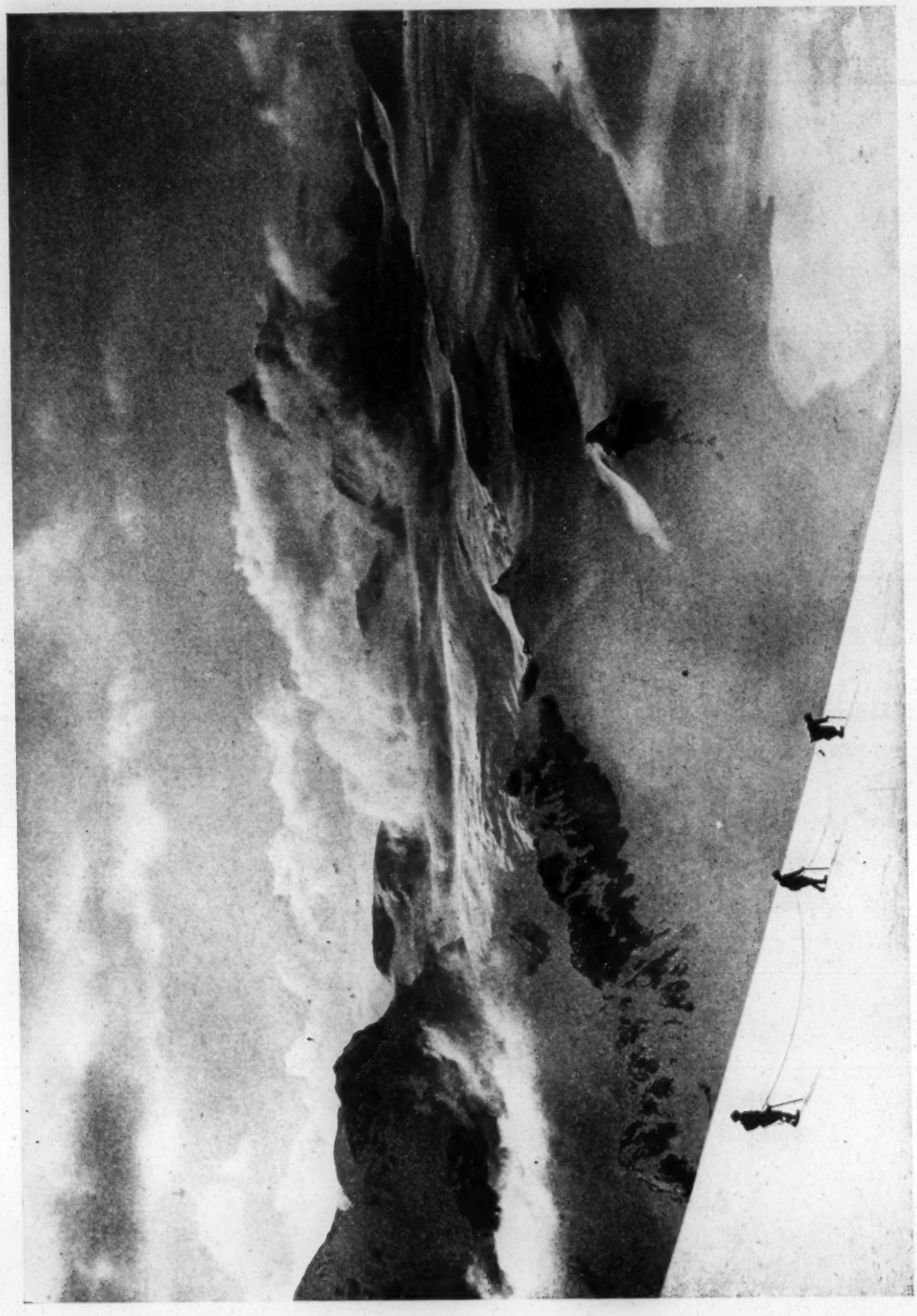


Photo by G. P. Abraham

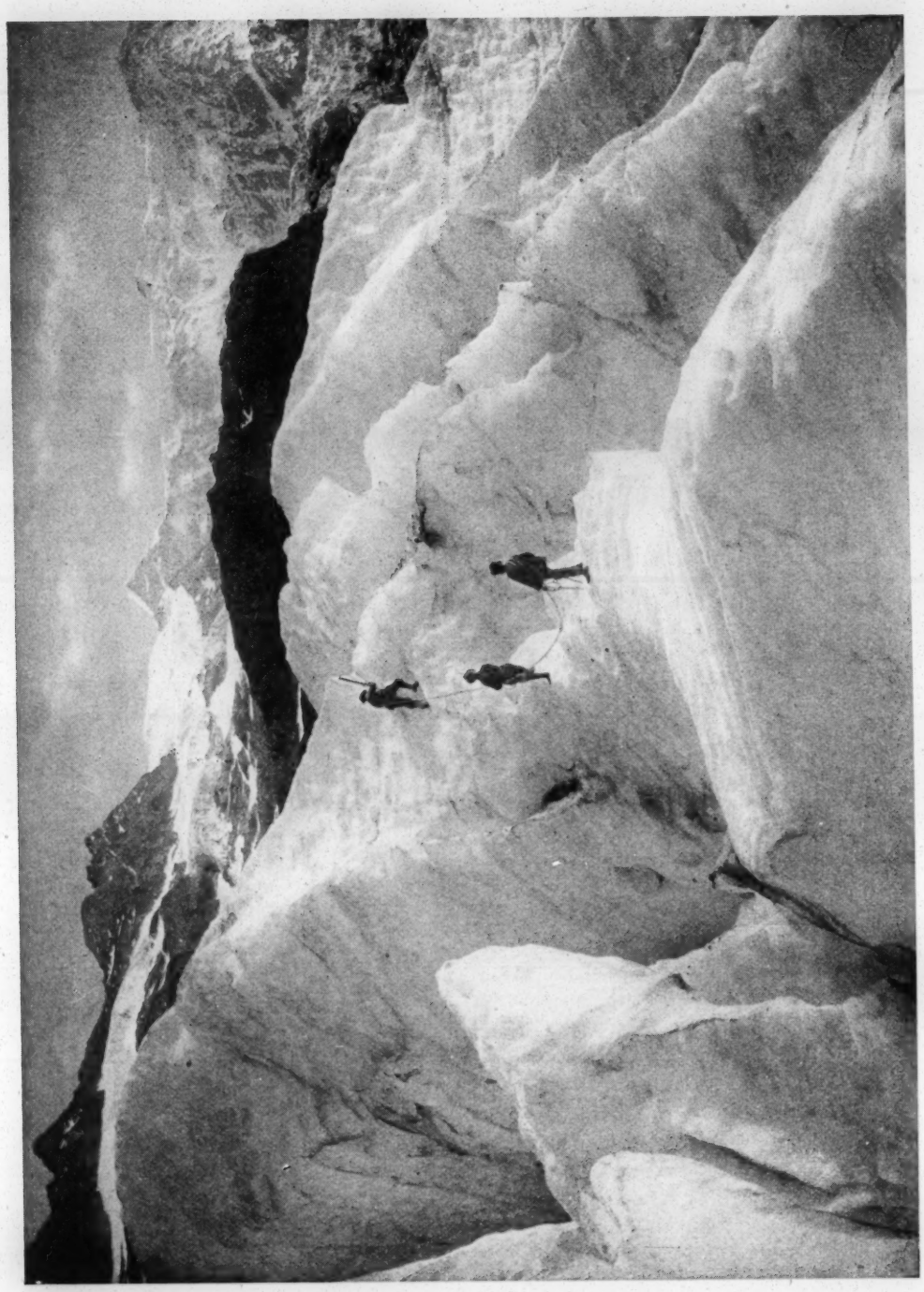
DENT DE SATARMA, IN THE CENTRAL PENNINE ALPS

A curious rock needle, 120 feet high, apparently difficult, yet "accessible by a rough scramble of ten minutes"



A MISTY MORNING: ON THE WAY TO THE AIGUILLE DE LA ZA

Photo by G. P. Abraham



AMONG THE CREVASSES OF THE UPPER GRINDELWALD GLACIER

Photo by G. P. Abraham

safety—perhaps one of the most harrowing of all these tales of horror.

CONCLUSION

We have scheduled rather than narrated the most notable of the new ascents of the last half century. Many have been the conquered peaks, and in several regions few of the first order have been left unclimbed. In others there still remains an embarrassment of riches, as particularly in the great Asiatic field. Even as we write these lines the Duke of the Abruzzi, with his earlier companions, Sella, De Filippi, and the guide, Brocherel, who was with Dr Langstaff on Trisul, are *en route* for Kashmere with Mount Godwin-Austen, K_2 (28,250), as their goal—the second highest measured peak on our globe. Not underestimating the difficulty of surpassing present records, they are making this their endeavor, and their many well-wishers on both sides of the Atlantic are confident that all that careful preparatory study, perfect equipment, and resolute wills can accomplish will surely be performed.

On our own continent many prizes still remain to be won. In the Canadian Rockies, Mount Robson (13,700 feet), presumably the highest of the range, beckons from afar in its northern seclusion; nearer at hand the bold north tower of Mount Goodsir will doubtless prove as fine a climb as its vanquished companion, while for those who will brave the untraveled tangle of a dense primeval forest the loftiest peaks of the Selkirks are waiting. And how comes it that those superb southern outposts of the Alaskan range, Fairweather (15,500), Crillon (15,900), and La Perouse (11,300), have never so much as been attempted, though the tide of summer travel brings hundreds annually within sight of their proud fastnesses? It is doubtful whether Mount Logan, with its added thousands of feet in altitude, would offer a more sporting climb than these glorious peaks. It is clear that American alpinists have no need to seek upon other continents a field for exhilarating climbing or fruitful exploration.

A WONDERLAND OF GLACIERS AND SNOW

By Milnor Roberts, University of Washington, Seattle

THE Editor of the National Geographic Society recently asked the members to name those articles in the last volume of the Society's Magazine which seemed most interesting. Opinions on such a question naturally would differ widely, but it must be admitted that in the remarkable array of subjects treated some of the most striking articles consisted of illustrated descriptions of snow-clad mountains and polar regions. The remoteness of these scenes may add to their charm, but it also lessens our chances of ever seeing them. The Mount Rainier National Park, a wonderland of glaciers and snow in our own country, is so easily reached in summer that it is becoming fairly well known to travelers. A recent visit to the park made by the writer and a party of friends has shown that the slopes of Mount Rainier may be reached even in winter without discomfort.

The Mount Rainier National Park, of 324 square miles area, includes the symmetrical, glacier-clad slopes of the mountain and a broad belt of magnificent forest land around its base.* In 1883 Pro-

* Glaciers of Mount Rainier, by Israel Cook Russell; with a paper on The Rocks of Mount Rainier, by George Otis Smith. 18th Annual Report, U. S. Geological Survey, part II, pages 349-423, illustrated.

MELTING SNOW CLINGS TO THE SKIS Photo by Carl F. Gould

fessor Zittel, the geologist, and Prof. James Bryce wrote of Rainier:

"The peak itself is as noble a mountain as we have ever seen in its lines and structure. . . . The combination of ice scenery with woodland scenery of the grandest type is to be found nowhere in the Old World, unless it be in the Himalayas, and, so far as we know, nowhere else on the American Continent."*

The altitude of Rainier has been reported between 14,394 feet† and 14,526 feet, placing it either first or second among the peaks in the United States proper. A difference of a few feet, which can be determined only by accurate measurement, is of slight importance to the ordinary observer. The noteworthy facts are that Rainier stands absolutely alone, is snow-clad throughout the year, and may be seen in its entirety from sea-level at distances of forty to one hundred miles to the westward.

* Ibid., page 412.

† Mount Rainier, Mount Shasta, and Mount Whitney as sites for Meteorological Observations, by Alexander G. McAdie. Sierra Club Bulletin, Vol. VI, No. 1, January, 1906, pages 7-14, illustrated. San Francisco, Cal. (See other articles in this number.)

The Cascade Range, in its north-south course across the State of Washington, has a general summit elevation varying from five to seven thousand feet, above which tower the volcanic peaks of Mounts Adams, Saint Helens, Baker, and Rainier. Glaciers still linger on nearly all the higher peaks, as relics of the ice-sheet which once covered the whole range. Many cirques of former glaciers are occupied now by fields of snow and névé of great thickness. The snowfall is heavy throughout the mountains, due to the chilling of the warm, moist winds from the Pacific. In spite of the glaciers and snows, the winter climate of the Cascades is mild.

The railway station nearest to the Mount Rainier National Park is Ashford, on the southwest, fifty-five miles from Puget Sound by the Tacoma and Eastern Railway. Camping parties with wagons or automobiles must come in from the lower country by the county road passing through Ashford, but packtrains can be driven into the park by four or five other routes. The county road from Ashford continues up the Nisqually River for six miles, to the western bound-

Photo by Milnor Roberts

7 FEET OF SNOW ALONG PARADISE RIVER

Photo by Milnor Roberts

EAGLE PEAK FROM THE RAMPARTS

Photo by Milnor Roberts

SOUTHERN FACE OF MOUNT RAINIER: 10,000 FEET FROM VALLEY TO PEAK

Photo by Carl F. Gould

SKI RUNNERS ON THE WAGON ROAD IN MOUNT RAINIER NATIONAL PARK

Photo by Milnor Roberts

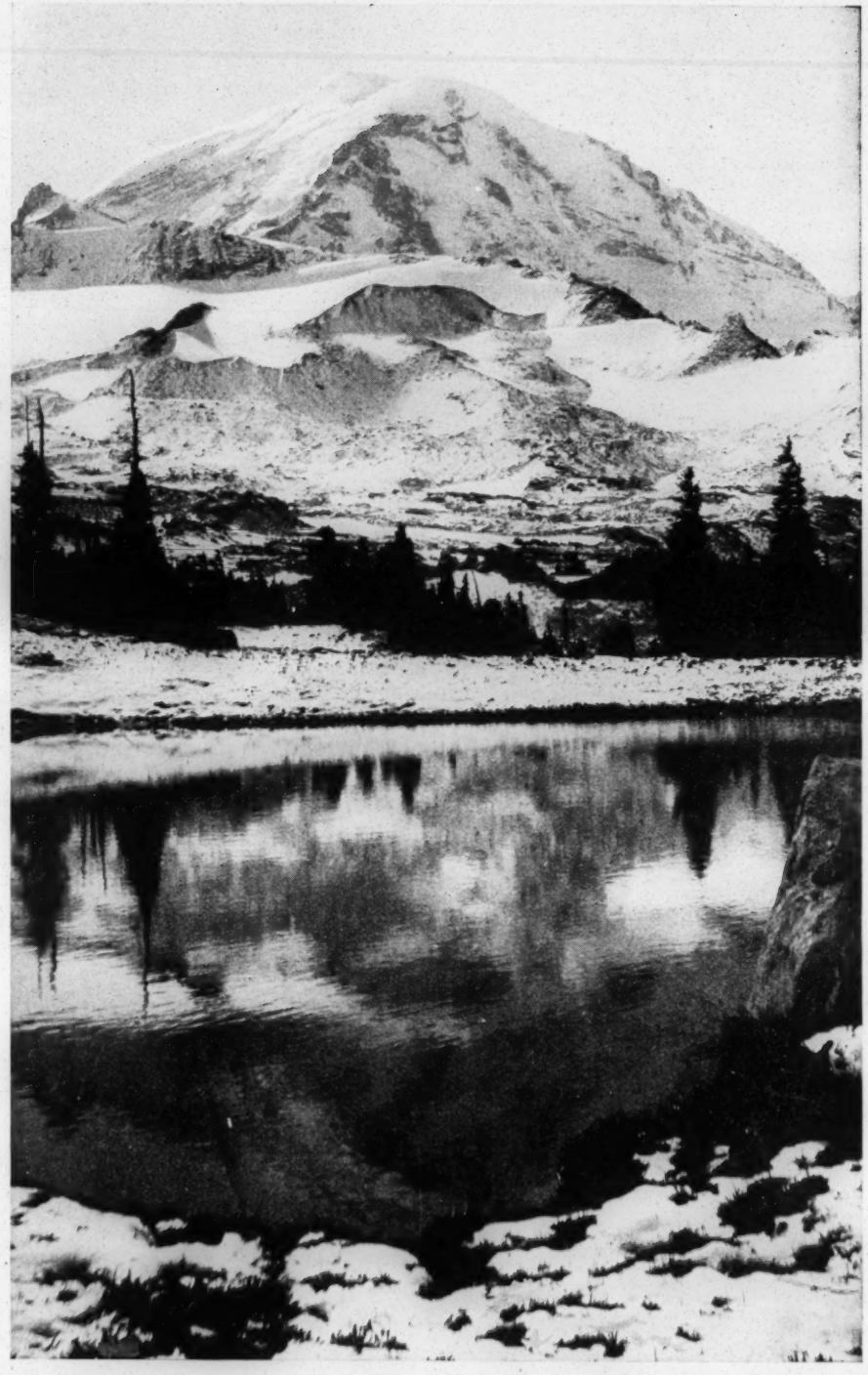
14 FEET OF SNOW ON THE WAGON BRIDGE ONE-HALF MILE ABOVE NARADA FALLS: MARCH 30, 1909

ary of the park, at which point it joins the government road. The latter has a maximum grade of 4 per cent, and extends to Paradise Park, a favorite camping ground near timber-line, between the Nisqually and Paradise glaciers.

In summer the Ashford stages run thirteen miles, to Longmire's Springs, where there are two hotels. The road is open, however, past Nisqually Glacier and Narada Falls, several miles farther up. During the season of 1909 a temporary road with steeper grades will be completed to Camp of the Clouds, at an altitude of 5,600 feet. Eventually the permanent road will reach 7,000 feet, where trails will branch off. An automobile party leaving Seattle or Tacoma in the morning can pitch its evening camp in one of the dense groves of stunted trees at timber-line in the shadow of the great peak, looking out upon the jagged pinnacles of the Tatoosh Range and the vast forest wilderness to the westward.

On March 18 our party found three feet of snow at the National Park Inn at Longmire's Springs. On the morning after our arrival a dense cloud-bank hung a few hundred feet overhead. Frequent flurries of snow came drifting down from it, now in matted bunches of moist flakes an inch wide, again as separate crystals, these in turn giving way to little rounded pellets like dry sago, which hopped from bough to bough down through the evergreens. Our skis settled silently through the fresh snow, as we trailed up the government road along the Nisqually River, intending to break a trail part way to Paradise Valley, the goal of our trip. During the midday thaw, masses of snow clung to the worn spots on the sole of a certain ski in the outfit. After many gyrations and contortions had been made by its fair owner in removing the burden, she announced piously, "My soul is ready for Paradise," and on we "mushed" again.

On the trail up the narrow valley of the Paradise River the snow was found to be a foot deeper for each two or three hundred feet of elevation gained. So quietly had the flakes fallen in the sheltered valleys that each stump and fallen tree was covered almost as deeply as the surrounding ground, as some of the photographs show. On the exposed ridges, however, the winds had piled huge drifts over the brow of every leeward slope.



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MOUNT RAINIER FROM CRATER LAKE

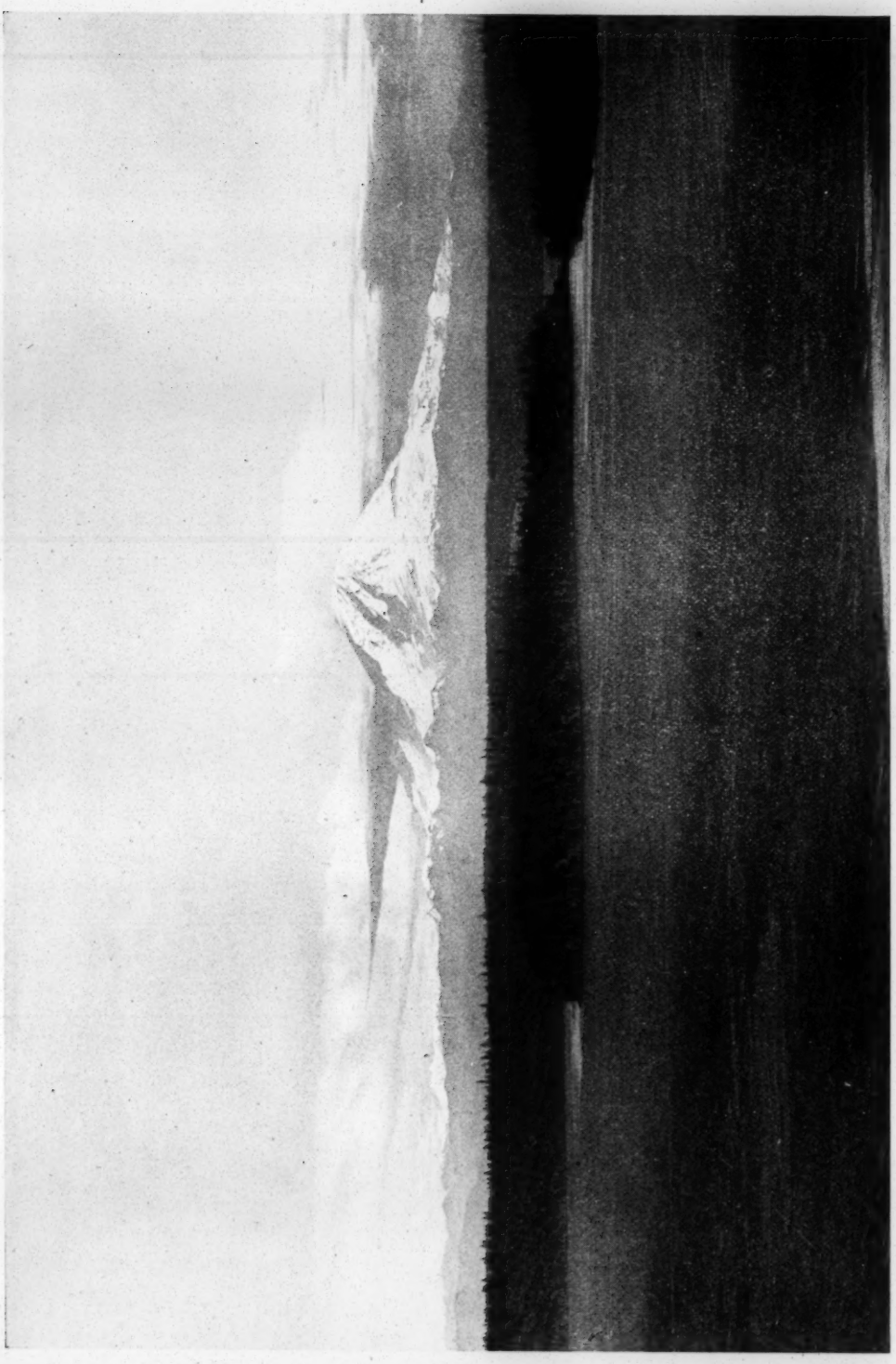


Photo and copyright by Romans Photographic Co.

MOUNT RAINIER (14,363 FEET) FROM LAKE WASHINGTON (ELEVATION 22 FEET), AT SEATTLE, 60 MILES NORTHWEST

Cornices of snow overhanging the crags of Eagle Peak had broken off and shot down its precipitous northern side, coming to rest on a long talus slope near the stream. There we reveled in ski sliding and jumping. Huge boulders in the talus beneath the seven-foot covering of snow had caused hummocks on the surface which served us in place of the artificial take-offs used in regular ski jumping.

Two divisions of our party made the ascent to Paradise Valley. The first group consisted of three men, including the writer. We followed the general course of the horse-trail, but made frequent cut-offs by crossing Paradise River on the snow bridges. The only toilsome part of the journey was at Narada Falls, where we were forced to navigate our skis sidewise, in crab fashion, up the steep slope. Half a mile farther upstream, on the second bridge of the government wagon road, the snow measured more than two ski-lengths in depth, at least fourteen feet, without a sign of drifting. Under the bridge was a pool of open water overhung on all sides by rounded cornices of soft snow. A few inky-bottomed wells marked the upper course of the stream for a short distance, until it disappeared entirely under the deepening load of snow.

The long, open meadow in Paradise Valley lay like a smooth floor of snow, rising slightly until it merged into the final slopes of Mount Rainier. The surrounding ridges, dotted with the tops of stunted trees, had been so rounded and smoothed by drifting that the small gulches and hillocks of ground were almost blotted out. Constant shifting of the dry snow had produced a fine, powdery surface everywhere. All appearances indicated that the snow in the open meadow of Paradise Valley was much deeper than at the bridge where we had measured it. The difference in location and elevation of the two localities may be held accountable for such a condition. Some marks which we made on a tree trunk at the surface level of the snow will be interesting reading in summer.

Excellent views of Mount Rainier and its southern glaciers were had on a brilliant sunny day from the Ramparts, a long ridge covered with standing burnt timber, extending southward from the mountain. A series of cascades in the South Tahoma Glacier caused the ice to stand out in jagged blocks against the skyline. The surface of the Kautz Glacier was perfectly smooth with snow except at its cascades. From Gibraltar Rock a snow banner as large as the rock itself waved to the eastward.

On March 24, another cloudless day, two young ladies of our party, accompanied by James McCullough, watchman at the National Park Inn, made a ski trip to Sluiskin Falls, considerably beyond the point reached by the first party. As both the ladies had ascended Rainier in summer, they could enjoy to the utmost the wonderful view of the snow-clad range spread out before them.

The Cascade Range in its winter garb is just beginning to be appreciated. Hotels at several mountain resorts now remain more or less open throughout the winter. The great advantage of visiting the higher altitudes lies in the drier snow usually found there, with only a slightly lower temperature. The beauties of the forests and the snow-fields may be seen without hardship by any visitor, while experienced mountaineers have unlimited opportunities for climbing and exploring on trips of two or three days. The writer's experience, gained through mining work in various parts of the range at all seasons, has been that only the severest storms or the heaviest rains make the Cascades unpleasant. So far as ski sport is concerned, it would be difficult to imagine more perfect riding than can be had on the many miles of varied slopes in Paradise Park. Judging by the fresh tracks of snowshoe rabbit, weasel, marten, fox, wildcat, white goat, and bear which our party saw in a few days, it is safe to say that the Mount Rainier National Park offers good chances to the camera-hunter.

VIEW SOUTH FROM KEARSARGE PASS (11,823 FEET) ALONG THE MAIN CREST, THE BACKBONE, OF THE HIGH SIERRA: UNIVERSITY PEAK IN BACKGROUND (13,583 FEET)

"We do not find among the Main Crest peaks any mountains rising as great isolated masses. They are rather peaks capping a gigantic wall than great individual mountains. For the same reason the passes over the Sierra are high relatively to the peaks. For instance, between Mammoth Pass and the Hockett Trail, nearly 1,000 miles, there is no notch lower than 11,000 feet." Note and photo by Joseph N. Le Conte

THE HIGHEST POINT IN EACH STATE

FREQUENT reference is made to the highest point in the various states of the United States, and in many instances they are erroneous as to elevation and even to location. Books of reference differ greatly as to the heights of well-known summits, and in some states the highest points have not been measured. The Government surveys afford data for many of the states, and the following figures, compiled by N. H. Darton, of the U. S. Geological Survey, are mainly from that source. A few special determinations were made by Mr Darton in the course of his geological work in the West:

List of Highest Altitudes in the States of the United States.

The data are from *maps* of the U. S. Geological Survey, unless otherwise stated.

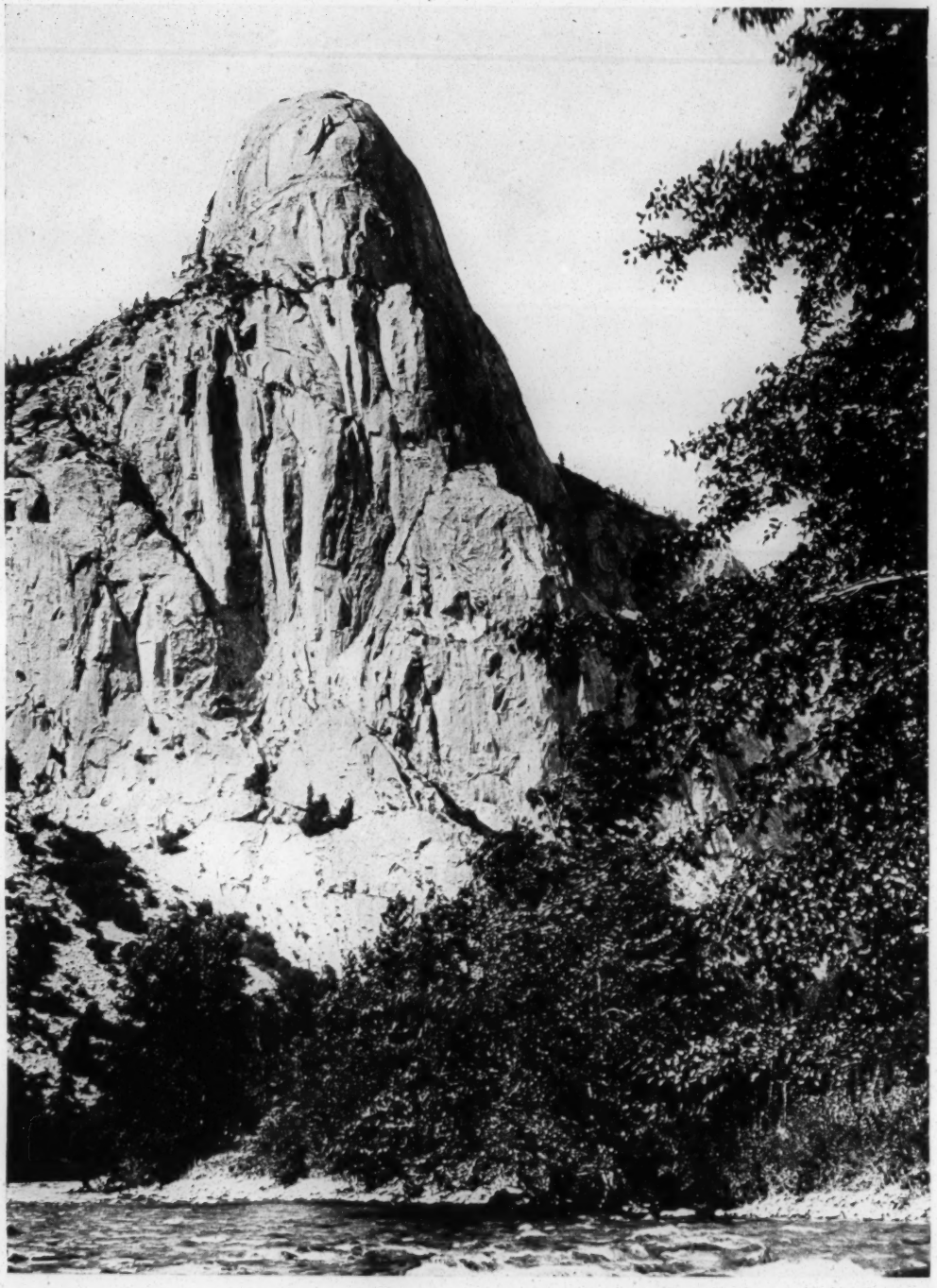
Alabama, Che-aw-ha Mountain	2,407
Alaska, Mount McKinley	20,300a
Arizona, San Francisco Peak	12,611
Arkansas, Magazine Mountain (?)	2,800a
California, Mount Whitney	14,501
Colorado, Mount Elbert	14,436
Connecticut, Bear Mountain	2,355
Delaware, 2 summits near Brandywine	440+
Dist. of Columbia, Fort Reno, Tenley	421C
Florida, near Mount Pleasant Station	301 RR
Georgia, Brasstown Bald Mountain	4,768
Idaho, Hyndman Peak	12,078
Illinois, Charles Mound	1,257R
Indiana, near summit, Randolph Co.	1,285a
Iowa, 5 miles SE. of Sibley	1,670S
Kansas, West boundary, north of Arkansas River	4,135a
Kentucky, The Double, Harlan Co.	4,100a
Louisiana, summits in western parishes	400+S
Maine, Mount Katahdin (west)	5,268
Maryland, Backbone Mountain	3,400a
Massachusetts, Mount Greylock	3,505
Michigan, Porcupine Mountain (?)	2,023L
Minnesota, Misquah Hills, Cook Co.	2,230aS
Mississippi, near Holly Springs	602
Missouri, Tom Sauk Mountain	1,800aS
Montana, Granite Peak	12,834aK
Nebraska, Plains in SW. corner	5,300+D
Nevada, Wheeler Peak	13,058C
New Hampshire, Mount Washington	6,290
New Jersey, High Point	1,809
New Mexico, peak 2 miles N. of Truchas Peak	13,306
New York, Mount Marcy	5,344
North Carolina, Mount Mitchell	6,711
North Dakota, south part Bowman County	3,500+D
Ohio, 1½ miles E. of Bellefontaine	1,540W
Oklahoma, SW. corner T. 1 R. 1	4,700+D
Oregon, Mount Hood	11,225
Pennsylvania, Blue Knob	3,136
Rhode Island, Durfee Hill	805
South Carolina, Sassafras Mountain	3,548
South Dakota, Harney Peak	7,240
Tennessee, Mount Guyot	6,636G
Texas, El Capitan, Guadaloupe Mtn.	8,690
Utah, Mount Emmons	13,428
Vermont, Mount Mansfield	4,406C
Virginia, Mount Rogers	5,719
Washington, Mount Rainier	14,363
West Virginia, Spruce Knob	4,860
Wisconsin, Rib Hill (?)	1,940S
Wyoming, Mount Gannett	13,785

a, approximate; +, or slightly higher; C, U. S. C. and G. S; S, State Survey; L, U. S. Lake Survey; W, U. S. Weather Bureau; R, C. W. Rolfe; K, J. P. Kimball; G, Guyot; RR, Railroad; D, N. H. Darton.

The highest points in Delaware are two rounded summits, one a mile east of Brandywine, and another just south of Centerville, both of which are slightly over 440 feet. The point given in the table as the highest in Maryland is in the narrow disputed strip lying along the West Virginia line. If this belongs to the latter state the highest point in Maryland will be a 3,340-foot peak a mile northwest of the 3,400 foot one. There is some doubt as to the highest points in the Central States, notably in Michigan, where it is claimed that Huron Mountains, in Marquette County, are higher than Porcupine Mountain. It is possible also that there are higher points in Minnesota and Wisconsin than those given, but they have not been measured.

In Florida the land north of Mount Pleasant probably is slightly higher than at the railroad station. In Louisiana the elevation is slightly more than 400 feet in Kisatchie Hills, in Sabine Parish; in some hills in the southeast corner of Claiborne Parish, and in some ridges in Vernon Parish, all in western part of the state, but their heights have not been accurately determined.

Arkansas has two peaks of nearly the same altitude. Magazine Mountain,



TEHIPITE DOME Photo by Joseph N. Le Conte

The clean, white granite walls of this noble dome rise as vertical precipices about 3,700 feet. The dome is the most impressive feature of Tehipite Cañon in the High Sierra and is the grandest rock face outside of the Yosemite Valley itself, and in many respects is not inferior to El Capitan or the Half Dome.

about 2,800 feet, and a peak on Fourch Mountain, in the southern part of Scott County, which has been determined as 2,800 feet.

The precise locations and heights of the highest points in Nebraska, Oklahoma, Kansas, and North Dakota have not been ascertained. A high ridge north of Kenton, Oklahoma, rises to 4,700 feet or higher. The highest point in Kansas is near where the west boundary is intersected by the Greeley-Wallace County line. Its altitude is about 4,135 feet. The highest point in North Dakota is in Bowman County, near the southern boundary on the divide east of the Little Missouri. The highest place in Nebraska is on the plains near the southwest corner of the state, where an altitude of about 5,300 feet is attained.

BRITTANY: THE LAND OF THE SARDINE*

By Hugh M. Smith

Deputy Commissioner, U. S. Bureau of Fisheries

OCCUPYING the large peninsula at the northwestern corner of France—washed by the English Channel and the Bay of Biscay—is a rugged country, with rugged inhabitants, who are less French than any other people of the Republic. Brittany has no political existence, and is not even represented on some modern maps, because it terminated its individual career in the closing years of the eighteenth century; but the Bretons, differing in ancestry, language, and temperament from their neighbors, have held aloof and maintained their racial characters in a way almost unparalleled in European history. Fierce wars have left their scars, and the concomitants of modern civilization have made their enduring impress on people and country; but so much of the ancient customs and landmarks has survived that Brittany is still a well-marked geographical and ethnological entity and bids fair to remain such for many generations.

This isolation of Brittany from the remainder of France, while at the same time the province is comparatively easy to reach and traverse, has for many years made it a popular holiday and vacation resort for Parisians and Londoners, and has attracted the notice of regular travelers and tourists who, having "done" the Alps, the Rhine, the Norwegian fjords, the Riviera, and the European capitals, are seeking new worlds to conquer. Artists of all lands have likewise found this a most agreeable field for work and recreation. The popularity of the region is attested by a score of modern books of travel, some written and illustrated by clever artists, describing the quaint charm of country and people and always giving the reader a keen desire to go and see for himself.

Some years ago I was privileged to visit Brittany in the interest of the Bureau of Fisheries, and the personal observations I then made incidentally to the special inquiries in hand form the basis for these necessarily desultory remarks.

WHERE THE BRETONS CAME FROM

The original name of Brittany was Armorica, which was changed in consequence of extensive immigration from Great Britain in the fifth and sixth centuries. The Armorican tribes formed a part of that race of which the Irish, Highland Scotch, and Manx constitute one division, and the Welsh, Cornish, and Breton the other. The Celtic language there spoken at the present time is divided into three or four rather distinct dialects, and is understood, if not

*An address to the National Geographic Society, March 26, 1909.

actually used, by a very large percentage of the native population. Many of the older Bretons cannot speak French, and in 1902 it was found that the French language was unknown or unused by 700,000 of the people. The government now requires the learning of French by the young, so we may expect the gradual disuse and final death of this ancient tongue.

Taking a brief glance at the history of Brittany, we may note that at a very

Photo from Hugh M. Smith

LITTLE BRETON MAIDS

remote period this country became thickly settled by a dark-skinned people that, starting a westward migration from some part of Asia, left monuments along their route throughout central and northern Europe, and only ceased their wanderings when stopped by the sea in Scandinavia, Ireland, Great Britain, France, Portugal, and Spain. In prehistoric times the Gauls conquered this early race; and then came the Roman conquest and the Roman occupation of Gaul until the fourth century, up to which time the peculiar religious practices of the aboriginal race appear to have flourished unmolested by either Gauls or Romans.

We read that in 383 Maximilian, son-in-law of Octavius of England, and his nephew, Conan Meriadec, went over to Armorica and endeavored to displace the Romans. This venture cost the lives of some 15,000 soldiers. Then Maximilian took over a huge army and eventually overcame the Romans. Conan became king of the country, which he called Little Britain, or Bretagne; and, making his capital at Nantes, he invited his countrymen, who were then very hard pressed by the Scots and Picts and Saxons, to come over and join him. Many thousands responded to this and subsequent invitations, and by the time of Conan's death, in 421, Christianity, that had been introduced with the Briton immigrants, had been established and paganism almost abolished over a large part of the country.

In the middle ages the dukes of Brittany exercised semi-royal prerogatives, and the people had a separate parliament for many years preceding the French Revolution. At the outbreak of that momentous struggle the Bretons lived up to their reputation for conservatism and remained loyal to the monarchy, and forcibly resisted the establishment of the republic long after the other parts of France had accepted the new regime. This sanguinary chapter in the history of the country has been vividly portrayed in Balzac's stirring novel, "The Chouans."

The Britons, at first the friends and kindred of the Bretons, eventually became their hereditary enemies. For centuries the British privateers and naval vessels ravaged this coast, blockaded the harbors, bombarded the towns, landed fighting parties, and the long-continued and deep-seated animosity thus engendered still abides in this land, where changes in habits and customs and sentiment occur very slowly.

The present population of Brittany is about 3,260,000. The principal cities are

Brest, the great naval port of France, beautifully located on one of the best harbors in all Europe; Rennes, in the interior, brought prominently to the world's notice some years ago as the scene of Dreyfus' first trial; and Nantes, on the Loire, the largest and one of the most interesting places in all Brittany. Its chief attraction is its hoary age and romantic history. It is mentioned by Cæsar, Pliny, and other writers of their time, and was a city of note long before Cæsar divided all Gaul into three parts. In the middle ages it was one of the most valuable possessions of the semi-royal dukes of Brittany, and when, in 1499, Anne of Brittany here wedded Louis XII it passed to the crown of France. During the Revolution it was the scene of the most atrocious massacres, and in 1793 fully 30,000 men, women, and children were here butchered.

SUPERSTITIOUS TEMPERAMENT OF THE BRETONS

Every observant traveler soon realizes that the dominant note in the Breton character is the universal and ineradicable belief in a higher power, which is not only worshipped, but is regarded as influencing or determining every incident in their daily lives. Most peculiar religious superstitions are current; witchcraft, charms, and antidotes are believed in, and fairies and other creatures of a childlike imagination here have a very real existence to both young and old.

All of the people are now nominally Christians, but Druidism flourished in some remote sections as late as the seventeenth century, and it is an interesting fact that the veneration accorded the heathen deities in the earliest centuries of Breton history was easily transferred to the Holy Family and the Christian saints when the new religion reached the country. In no other part of Europe, if indeed in any other part of the world, has Christianity absorbed so much of earlier creeds, and it requires no particularly astute observer to appreciate that many features of Breton religious practice today are relics of prehistoric paganism.

It is easy to understand how the superstitious temperament of the Bretons has been developed by their isolated geographical position and the impressive character of the country, by their distinct language, and by their being brought constantly in contact with those strange megalithic remains which are here more numerous than anywhere else.

A sympathetic foreigner* has given an admirable estimate of Brittany and the Breton character that should always be borne in mind:

Photo from Hugh M. Smith

ITINERANT BASKET VENDOR

"Those who would wish to see Brittany as she really is must not look at her wild and barren plains, her bleak, dreary mountains, her dark and sombre forests, her stormy and rock-bound shores, and her lonely, lovely valleys with the hasty glance they cast on any other passing landscape, with the hard practical eye and fastidious tastes of modern travelers; they must think of her as the land that has been consecrated by the earliest feats of chivalry, perhaps the only spot in the modern world that has preserved in her legends untarnished the

* Wallace-Dunlop: Wanderings in Brittany.

'eternal youth of phantasy.' Here, it is not only 'the spirit that haunts the last year's bowers,' but the spirit of ages past, that looks you in the face.

"The traveler must not regard the melancholy Breton, alternately taciturn and eloquent, simply as an unlettered and morose peasant, but as a being cradled in superstition, endowed by nature and education with a vivid imagination, with a deep, true, poetical sense, with strong and gloomy religious views, to whom the 'spirit-land' is an ever-present, an ever-living reality, and who indemnifies himself for his hard lot on earth by a constant reference to the future joys of heaven."

ABOUT THE SIZE OF MARYLAND

Brittany is a small country. Its extreme length from north to south is only 150 miles and its greatest width is about the same. The area is 13,600 square miles, or a little larger than the State of Maryland.

The peninsula has a backbone of crystalline rock, and the country should be classed as semi-mountainous, although there are no noteworthy elevations. It bears a strong resemblance to the peninsula of Cornwall, the nearest land toward the north, but the parts away from the coast are much inferior to Cornwall in fertility and attractiveness and contain no mineral deposits of great value. Some rather extensive forests still remain, but the characteristic feature of the interior regions is the vast tracts of wild moorland, marked only by melancholy stone monuments.

The coast is much intersected and is the only part of France that abounds in good harbors; this fact, together with the abundance of water products, has made the sea the dependence of a large proportion of the population.

The characteristic dress of the people, changing as little as their beliefs and customs, is practically the same in every detail as it was generations ago. Now and then we see a man or woman who has been to Paris or London and affects a modern style; but the great mass of the population have no intention or desire to adopt any newfangled fashions, and it is this fact that gives such a distinctive charm to city and suburban sights.

For all ordinary purposes and on all ordinary occasions, the women dress in short skirts and loose waists of some cheap black or dark-blue fabric, and usually wear a broad white collar and often a white or colored apron. White caps with or without lace are invariably worn out of doors, and the hair is usually scrupulously concealed.

In the coastwise districts the dress of the men usually consists of a coarse blouse, loose trousers, and a flat woolen or cloth cap. On special occasions, such as weddings and church festivals, the men wear a short black velvet or cloth jacket with large buttons, and a low-crowned, wide-rimmed hat with long ribbons hanging down behind.

The dress of both men and women shows slight peculiarities depending on the district or section, so that it is often possible for a foreigner soon to determine the village or town from which given persons may have come, and even adjacent villages will have slight differences in shape of cap, style of neckwear, or cut of skirt that are readily appreciated when once pointed out. There are also slight peculiarities of dress dependent on occupation.

Along the extensive coast the sea incessantly exacts a heavy human toll, and the extent of this is everywhere and on every occasion manifest in the sign of mourning worn by the women—a partly black cap replacing the white one. Sometimes I met groups of women nearly every one of whom showed by her dress the recent loss of husband, father, son, or brother.

SOME CUSTOMS OF THE PEOPLE

A bride among the peasant and fishing people may be recognized by the handsomely embroidered apron and abundance of hand-made native lace on bonnet, skirt, and waist.

Apropos of lace, I may state that philanthropic people in Paris, America, and

elsewhere have turned their attention to possible industries for the coastwise Bretons that will not be dependent on the uncertain hazard of the sea, and among other things they have suggested is the revival of lace-making to give employment for the women, who in past years used to make lace that for beauty was not surpassed in France; but this industry has fallen into decay.

The differences in the dress of adults dependent on place of residence and occupation are seen likewise in the clothes of the children. Some of the quaintest, drollest bits of humanity imaginable are met with among these people.

The Bretons have large families, which, as you are well aware, is not the case in other districts of France at the present time. The children are necessarily much neglected by their parents, who are thoroughly occupied with their labors during the day. As the children play in the dirty roads and streets and on the dirt and mud floors of their homes, they manage to acquire and retain more misplaced matter than any other youngsters I ever saw. It is said that in the coast towns, where the struggle for existence is so keen and every available moment must be occupied while the fishing is in progress, the children have their face and hands washed only once a week and their clothes changed even less frequently. I am sure that your observations would concur with mine and confirm this report. But it must not be supposed that in town and country one does not see many attractive, well-kept youngsters.

Nearly every one wears huge clumsy wooden shoes, which are made by hand in the country districts. As the streets and roads are hard and as the shoes are loose, the people make a great clatter when they walk. The characteristic sound of the villages and towns is the rumble of wooden shoes.

The Bretons are a highly moral people. Practically their only vice is drink, but that is in reality a scourge. "The soberest have their days in which they usually get dead drunk." Drunkenness is particularly prevalent among the fishermen, whose hard life, together with the uncertainties of fishing and the ease with which comparatively large sums are sometimes acquired by a lucky strike, seems to induce an extraordinary amount of dissipation that is made possible and encouraged by numerous cheap public drinking houses in all the coastwise villages and towns.

CHEERLESS HOUSES

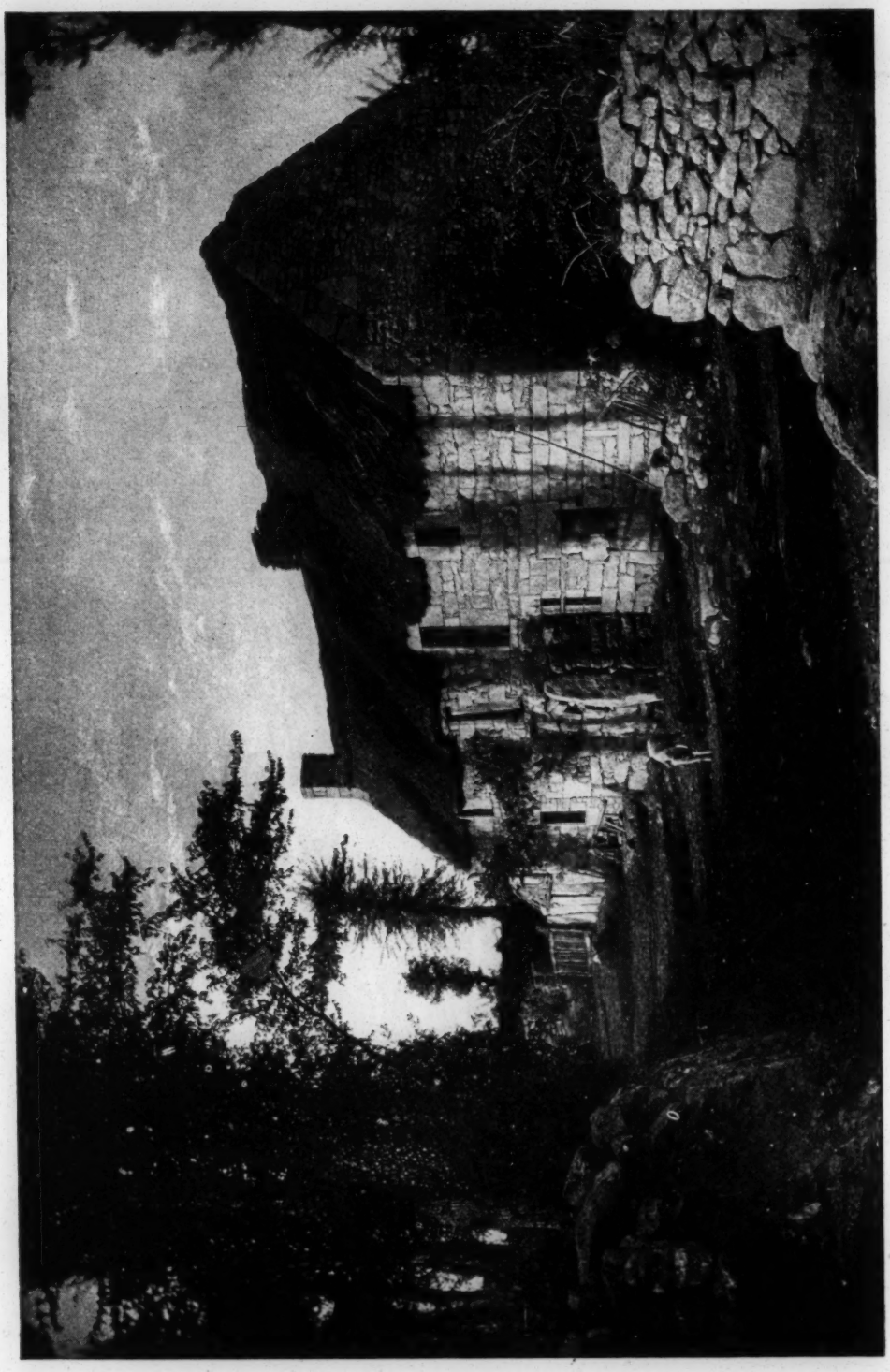
The abundance of stone everywhere and the scarcity of timber in many places have determined the building material for most of the houses, churches, and other structures in Brittany. When for any reason building stone is scarce or otherwise lacking, the people have often had recourse to the prehistoric monuments for their homes and churches.

The churches afford most fascinating material for the study of the architect and the antiquarian. Beginning with the eleventh century, they present a most interesting record of the evolution and progress of ecclesiastical architecture. Large castles are rare, and in practically every community it is the church that is the most imposing structure.

The houses of peasants and fishermen are for the most part small, one-storied, with steep, thatched roof. In a few places I noticed the walls formed entirely of upright granite blocks 7 or 8 feet high. Windows (often without glass) are small, few in number, and not infrequently altogether lacking in the poorest houses.

The floors are of dirt, which is often converted into mud and remains so, and the interiors are usually chilly and cheerless. In many families there is a common bedroom in each house, with a bed in each corner, and it is no unusual thing to find the same room shared by a litter of pigs and perhaps several goats.

Among the better class of farmers we find more pretentious homes, surrounded by substantial stone walls and supplemented by barns and storehouses in keeping with the residence; but even in such a house we may find striking evidence of



A BRETON PEASANT'S HOME

Photo from Hugh M. Smith

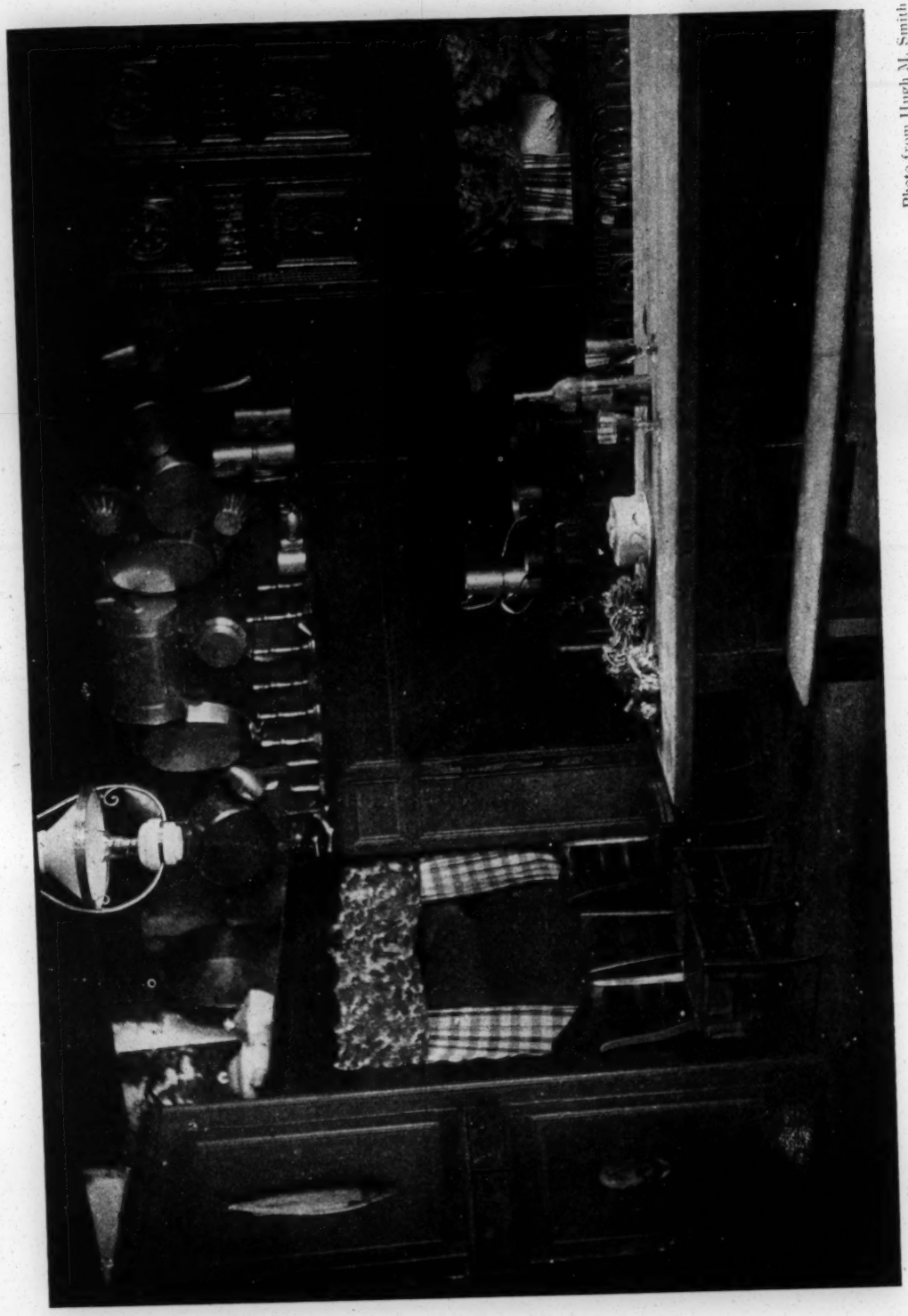


Photo from Hugh M. Smith

THE PRINCIPAL ROOM IN A BRETON PEASANT'S HOME
Note the built-in bed on each side of the fire-place

SHRINE AND SPRING Photos from Hugh M. Smith

A PEASANT TYPE: MAID WITH WATER PITCHER

Photo from Hugh M. Smith. Copyrighted by the Century Co.

BRETON WOMEN THRESHING THE GRAIN WITH JOINTED FLAILS, AS IN THE TIME OF RUTH

the simple life led by these people—a general living room, with a large, open fireplace to provide heat and means for cooking, and in close proximity a built-in bed.

Wells with massive stone copings are found at most of the larger country houses, and at these wells and in the yards some interesting and picturesque sights may be seen as we pass along the roads. Now and then one comes upon one of those interesting open-air ovens, in which is baked, among other things, the staple food of the peasants and fishermen—a coarse, black pancake made of buckwheat and known as *galette*.

While a large part of Brittany is not suitable for successful tillage, a preponderating percentage of the population have necessarily to engage in some form of agriculture for a livelihood. The coastal regions are the most fertile, and there considerable crops of flax, hemp, and cereals are grown and a limited amount of dairy farming is done. Many goats are kept for their meat, hair, and milk, and most of the peasants have bees, for which they are said to entertain deep affection.

MOST OF THE FARM WORK IS DONE BY THE WOMEN

Perhaps the most impressive feature of rural life in Brittany is the extent to which women and girls perform farm labor that is rarely done except by men among the Caucasian people in our own country. The country districts of this province, as of other parts of France, have been gleaned and scoured for men

Photo from Hugh M. Smith

OPEN-AIR OVEN AND CHARACTERISTIC COUNTRY CART

for the army, and it has become absolutely necessary for the women to carry on practically every branch of agricultural work. It is therefore the rule to find women, and the exception to see men, cultivating the fields, harvesting the grains, digging the potatoes, stacking the hay, threshing the rye, and preparing the farm products for market.

Of course, from one viewpoint, this condition of affairs is not only tolerable but desirable, for one result is the development of a sturdy, healthful race that would not exist if the women and girls lived in insanitary, crowded tenements and spent their days in dark factories or sweatshops. Still, one cannot help thinking how much better it would be if the men were there to do the men's work as we see it, and if the women had a little time to devote to the improvement of the mental condition of themselves and their children, and to the amelioration of the numerous discomforts of their homes, which are cheerless in the extreme.

Many of the farming methods and tools are of the crudest character. The threshing is done with jointed flails, just as in the time of Ruth, and for the winnowing of the grain the most primitive appliances are used. One is now and then surprised to come upon a windmill in the middle of a grain field, but it is a very different structure from the windmill of the Low Countries. Some aspects of the farming, on the other hand, might easily pass muster in Virginia or Pennsylvania, if it were not for the dress of the people and the presence of women on the scene doing work as laborious as any performed by the men.

In the interior districts the carding of the flax that is destined for their pretty caps and collars is done by the women themselves, with the simplest accessories; and likewise the spinning of the yarn for the fishermen's caps, mits, and socks is done after a fashion that is hoary with age.

A RACE OF FISHERMEN

Fishing and the shore industries connected therewith furnish a livelihood to a very large proportion of the inhabitants. With only one-thirtieth as many people as the United States, Brittany has half as many fishermen and one-twelfth to one-fifteenth the value of products. If the fisheries appear to receive an undue amount of attention, I ask you to remember that they are the mainstay of the entire coastwise population. Furthermore, I had rather talk about fishing than any other subject.

The Breton coast furnishes staple water products in great abundance and variety, and is perhaps as highly favored by nature for the support of important fisheries as any other region in the world. In no other country, with the possible exception of Newfoundland, does the success or failure of the fisheries mean as much to the people. It is from among the Breton fishermen that a large part of the best material in the French navy and merchant marine is recruited. In fact, among every five sailors and seamen of France, one is a native of Brittany and in all probability a fisherman by occupation. The fishermen are brave, hardy, hard-working, and competent. Their chief deficiencies as fishermen arise from their conservatism, which sometimes verges on obstinacy, their ignorance, and their superstition, and are manifested in their disinclination to adopt new methods and their tendency to attribute to occult or supernatural influences results that depend on their own efforts or on purely natural causes.

The most valuable of the fishes are the herring, sardine, anchovy, mackerel, and tunny. The tunny is more extensively caught on the Mediterranean shores of France than elsewhere, but quite a large number of Breton fishermen make a livelihood by tunny fishing. Small schooner-rigged vessels are employed, and the active, powerful, voracious fish are secured by trolling, a number of lines being attached to each of six or eight immense poles or rods that are extended over the sides of the vessel while the latter sails to and fro over the fishing grounds.

Among crustaceans, lobsters, langoustes, or spiny lobsters, and shrimps

GATHERING SEA-WEED IN THE SURF DURING A STORM: COAST OF FINISTÈRE. Photo from Hugh M. Smith

are the most important. Brittany supplies France with most of her lobsters and langoustes. They are caught in wicker traps, which differ from the lobster pots used on our New England coast in having a depressed conical shape with the entrance in the top. The lobsters, wrapped in wet seaweed and packed in cheap wicker trays or baskets, are shipped alive all over France.

A short time ago there was an alarming scarcity of lobsters and langoustes on the Breton coast, which was attributable to the octopus. This creature appeared in immense numbers on the fishing grounds, and not only reduced the abundance of lobsters there, but entered the lobster pots and ate the lobsters that had already been caught. As showing the interrelations of aquatic creatures, I might mention that the most potent natural enemy of the octopus is the conger eel, which was formerly abundant, but has recently been very scarce on the Breton coast, owing probably to too active fishing. We thus have the interesting fact that the scarcity of lobsters was in reality due to the scarcity of eels.

THE HARDIEST OF WOMEN

Shrimps are among the most popular of the marine products, and an important fishery is conducted for them, the little creatures being taken in small barrel-shaped traps. Shrimps abound in the coastal waters, and are much sought by women, who wade for them while pushing a triangular net along the grassy bottoms of bays and coves. These shrimpers must be among the hardiest—perhaps the foolhardiest—of their sex, for I have seen them working hour after hour in water that reached to their waists or chests and was entirely too cold for bathing.

France ranks next to the United States as an oyster-producing country, and an important part of the oyster industry is in Brittany. France many years ago discovered a thing that some American States are loath to acknowledge even today, namely, that the oyster crop cannot be harvested for an indefinite period from unplanted grounds. The acceptance of this idea has meant $4,000,000 annually to the French oystermen, whereas the pursuance of the policy that up to a few years ago prevailed in the great oyster regions of our Atlantic coast would have absolutely obliterated the oyster industry in our great sister republic.

Every suitable bay and cove and estuary on the coast of Brittany is utilized for oyster culture, and in 1905 there were over 4,000 oyster-growing establishments in the province. The seed collecting, transplanting, rearing, fattening, etc., are not done in open waters, but in parcs or claires, which are more or less exposed at low tide; and most of the work connected with this industry devolves on women. The output of these oyster parcs in 1905 was 135,000,000 oysters (for oysters in France are sold by number, not by bushels), valued at nearly $600,000. Owing to a variety of causes, among which are differences in habits, the French oysters are not susceptible of the same methods of culture as are ours, but require peculiar treatment and attention, with the result that they are literally brought up by hand, sometimes being actually handled individually as many as twenty times before the crop is finally gathered for market.

6,000 MEN ENGAGE IN THE COD FISHERY

The high-sea fisheries are very important, and are encouraged by the French government through the payment of liberal bounties. On the northern coast of Brittany some 200 vessels, carrying nearly 6,000 men, engage in the cod fishery on Dogger Bank, about Iceland, and on the Grand Banks of Newfoundland. Most of the vessels sail from the port of Paimpol, which you will recall as the home of Loti's "Iceland Fisherman." The hero was a real person, who never forgave Loti for having drowned him in the novel and who was eventually lost, on a return voyage from Iceland, when nearly within the harbor of Paimpol. The annual departure of the cod fishermen in early spring for the far-distant,

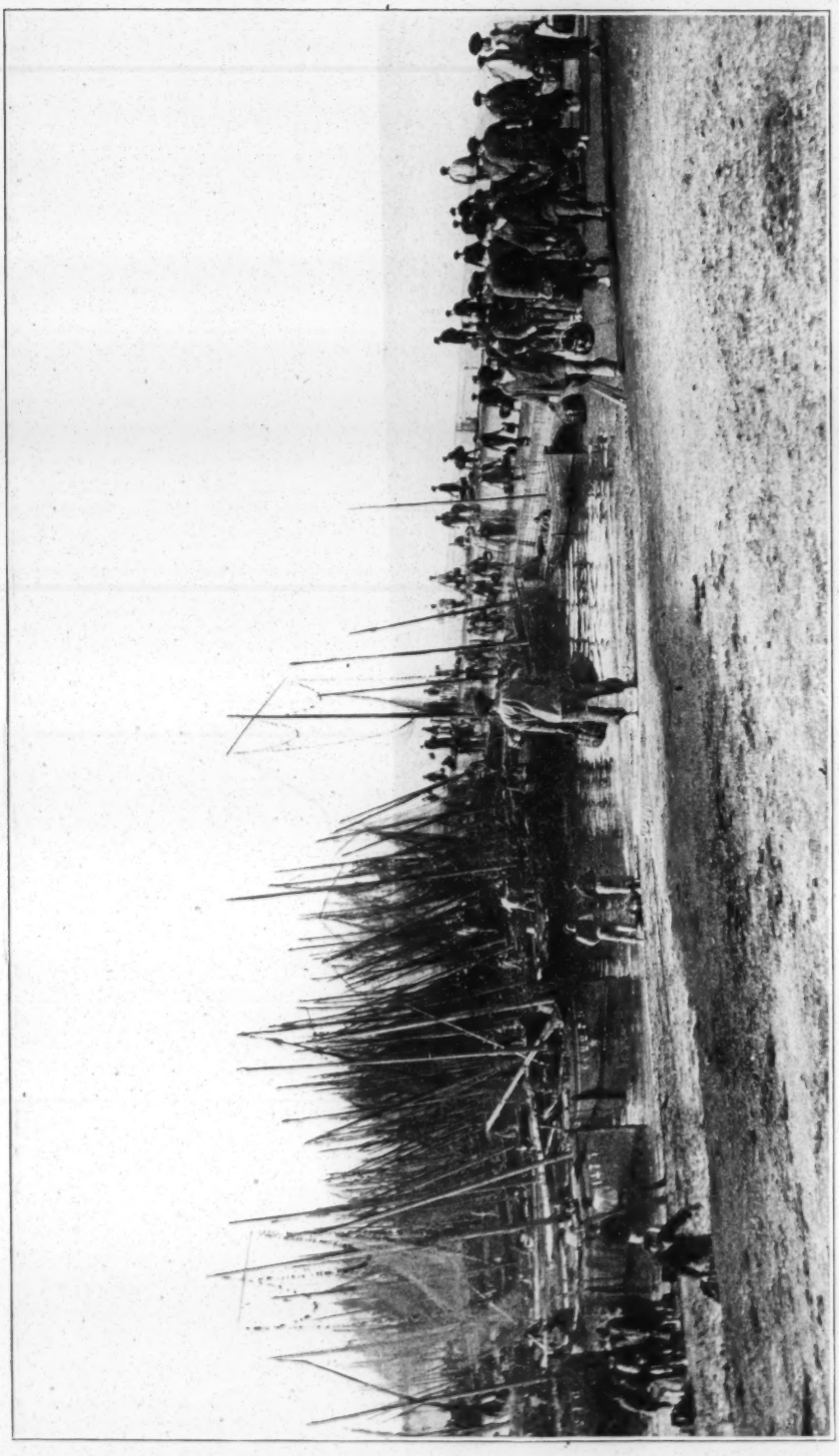


Photo from Hugh M. Smith

A FLEET OF SARDINE BOATS IN PORT

Note the nets suspended from the mastheads to dry

"dangerous, icy regions, whose summers know no nights" and their return in early autumn are the most important events in the current history of the fishing towns.

Another important industry connected with the water is the gathering of seaweeds. At certain seasons, after storms, immense quantities of algæ are washed on the shores, and thousands of Breton fishermen, farmers, peasants, and laborers then abandon their business and for a time collect the algæ. They enter the surf with rakes and pitchforks and make great piles of the weed on shore beyond the reach of the waves. The algæ are taken inland and either spread on the land as a fertilizer or dried and burned for the soda and iodine contained in them. The value of the marine vegetables obtained on the coast of Brittany has amounted to as much as $1,000,000 in some years, and that sum would doubtless have been largely increased did the government not restrict the gathering to particular periods, in the belief that at other times damage might be done to fishes and shrimps whose eggs and young are among the algæ.

The manufacture of sea salt by solar evaporation is carried on at various places on the west Breton coast, but is particularly extensive at Le Croisic, where from numerous flooded fields vast quantities of crude salt are gathered annually. This salt is much used in the cod and other fisheries and for general domestic purposes.

THE SILVERY SARDINE

But the leading product of the waters of Brittany is the sardine. This country has its own peculiar attractions for the artist, the archeologist, the linguist, and other specialists, and even ordinary tourists are often impelled to extend their travels thither; but the feature which appeals most strongly to the greatest number of Americans affects not their esthetic, artistic, or scientific tastes, but their gastronomic, through the medium of the canned sardine. Other countries and other parts of France produce sardines, but the sardine par excellence comes from Brittany.

Brittany is the center of the sardine fishery, and has all of the numerous establishments for the canning of the fish. In an average season the Brittany sardine fishermen number 25,000 to 30,000 and catch 100,000,000 to 150,000,000 pounds of sardines, for which they receive $1,500,000 to $3,000,000, while the shore industries dependent on the fishery give employment to 20,000 other persons, mostly women and girls. So important is the sardine that in many communities in Brittany every person is directly or indirectly supported by it, and the failure of the fish to come means ruin, starvation, and death to many people in the more isolated places.

The sardine fishery dates back many years, and even in the early part of the fifteenth century it was quite extensive, but it attained its greatest importance as a result of the perfecting of canning methods and the advent of the railroad in the fishing districts.

A great deal of unnecessary uncertainty and misinformation has existed and still exists with regard to the French sardine. It has long been known that the little fish canned in France is not a species *per se*, but is simply the young of the pilchard, which is one of the most valuable and abundant fishes of the south coast of England. The range extends from Sweden to the Madeira Islands and includes the Mediterranean Sea. The name "sardine," as you have no doubt surmised, has reference to the island of Sardinia, about whose shores the fish is abundant.

Sardines are found on the coasts of Brittany throughout the year, but occur in greatest abundance in summer and autumn. The small fish, in demand for canning purposes, have been hatched from eggs laid in the previous summer at a considerable distance from the land, and go in schools at or near the surface. As many as 100,000 have been taken at one time in one net from one school, but the usual size of the schools is not remarkably large.

THE PROSPERITY OF BRITTANY DEPENDS ON THE SARDINE

Like other free-swimming oceanic fish, of which the mackerel, bluefish, and herring are conspicuous examples, the sardine varies in abundance from year to year, and at times has been exceedingly scarce on the French coasts. Thus, from 1887 to 1890 there was an alarming scarcity, but after this four-year period the fish returned in as great numbers as ever. Again, from 1902 to 1906 the sardine disappeared almost completely, only to be followed by a period of great abundance. All sorts of theories have been advanced to account for these periods of scarcity, which appear to be coming more frequently than formerly and are giving the French government and people much concern. Among the causes assigned are over-fishing, the ravages of other fishes and of whales, the explosion of submarine mines and torpedoes in the French naval maneuvers, and divine providence.

It is difficult for us to realize what the failure of the sardine fishery means to the inhabitants of Brittany, for nowhere in our country has the failure of a fishery produced anything like the same results as in this little French province. Remembering that fishing is the principal occupation of the people, that the sardine is the principal fish, and that the fishery and the canneries bring in most of the money, you may be able to appreciate how it is possible in the winter following several poor seasons for 20,000 fishermen and 60,000 women and children to be in a state of actual starvation, with absolutely no means of helping themselves and dependent on the bounty of the government and private persons of means. The pitiable plight of the Breton fishermen and factory hands and their families has been told again and again during the present generation and the harassing tale has aroused the sympathy of all civilized countries.

The fishery is conducted with small, wide-beam, open boats, carrying two rather tall masts, each with a large, square lugger sail. The boats are propelled also by oars, which are of an exceedingly clumsy type, the blade being small and narrow, while the shaft is square and four inches in diameter. The length of the oars is extraordinary, averaging 33 feet, and as only one man plies each oar, we often find heavy stones tied on the butt in order to counteract the weight of the long shaft and blade.

In the early days of the fishery, nets were employed to surround the schools of sardines, and then stones were thrown to frighten the fish into the meshes. In this way large catches were often made and the markets were glutted, so the method came into disrepute and is no longer followed. Fishing is now done exclusively with gill-nets made of fine cotton twine; the nets are 45 yards long and 500 meshes deep, and the complement of each boat is 10 nets, representing 3 degrees of fineness, adapted for small, medium, and large fish. The nets are kept in position in the water by means of numerous cork floats and a few large stone sinkers.

A peculiar thing about the nets is that by means of an anilin they are dyed a bright greenish blue. This is for the purpose of preserving them and of rendering them less conspicuous in the water. When the nets are suspended from the mastheads to dry, they add greatly to the picturesqueness of the fishing boats and the wharf scenes.

Sardines are caught more or less throughout the year, but fishing is largely suspended from December to February, and the most extensive fishing is in summer and autumn. The boats start out early in the morning, so as to be on the ground when day breaks. The best fishing is then had, and the boats are often back to port by 9 or 10 o'clock with full cargoes.

When a boat arrives on the grounds the rear mast is taken down and the craft is headed toward the wind. If there is no wind, the sails are lowered and the boat is rowed by the four members of the crew. A net is put overboard and is slowly towed behind the boat by means

of a short line. When fish are abundant the fishermen often let one net go adrift when it is full of fish, trusting to pick it up later, and put out another net. The sardines are often found in a compact body containing hundreds of thousands or perhaps millions, and the boats will be concentrated in a comparatively small area, at times so close together that the operation of the nets would seem almost impossible and the chance of catching fish very improbable. The entire fleet of a given port, consisting of several hundred boats, may be at work on one shoal at one time.

SARDINE CANNOT BE CAUGHT WITHOUT BAIT

There are several features of the fishery that are most exceptional, not to say anomalous. One of these is that, notwithstanding the fish are caught in gill-nets, bait is used in large quantities and is indispensable. In no other net fishery in the world is bait so extensively employed or so essential to the success. Various things have been and still are employed for this purpose, but the bait now in general use is the salted eggs of the codfish, although any other small eggs will answer just as well. The reason cod eggs are used is that they may be obtained in immense quantities.

The casting of the bait, on the proper use of which a great deal of the success of fishing depends, is always done by the captain, who stands on a little platform in the stern and, while directing the movements of the boat and the manipulation of the net, throws the bait to attract the fish to the surface and around the boat. When the fish are on one side of the net or the other, his next move is to cast the bait in such a way as to cause them to rush against the net and thus become gilled.

Considerable skill and experience are required in having the net hang properly in the water and not become folded or wavy, owing to currents or tide, for unless the net is straight or only slightly curved, it will be seen by the fish and avoided.

When a net contains fish it is hauled into the boat and the catch is removed by gentle shaking or by hand. The delicate fish are put in a compartment in the bottom and are handled with great care, so as to avoid crushing and bruising. As no ice is used for preservation, it is important that the boats reach port as promptly as possible, and almost invariably the fish are landed in excellent condition, and are often delivered at the factories within an hour or two after capture.

The sardines are sought and found rather close to shore, thus permitting the use of small boats, and the landing of the fish a short time after capture is insured. Most of the fishing is done inside the bays and within two or three miles of shore, and only rarely is it necessary to go as far as ten miles from land.

THE SUCCESS OF THE SARDINE FISHING SEASON DEPENDS ALMOST ENTIRELY ON GETTING BAIT FROM NORWAY

Another remarkable fact regarding this fishery is that the indispensable bait is not a home product, but has to be imported at great expense, and therefore this most valuable fishery of France is absolutely dependent on the fishermen of other countries and its success is intimately related to the outcome of fisheries for other species in far-distant waters.

The annual consumption of cod roe for bait is from 40,000 to 50,000 barrels, and for this the Breton fishermen pay about $350,000. The greater part of the bait comes from Norway, where for at least two centuries the cod fishermen about the Lofoden Islands have been salting what would otherwise be a waste product and selling it at lucrative prices to the Bretons. Small quantities of this roe have been contributed by Newfoundland, Holland and the United States; but efforts to induce the French cod fishermen in Newfoundland, Saint Pierre and Miquelon, Iceland and the North Sea to save this product have been futile, notwithstanding that as early as 1816 the government offered French fishermen a

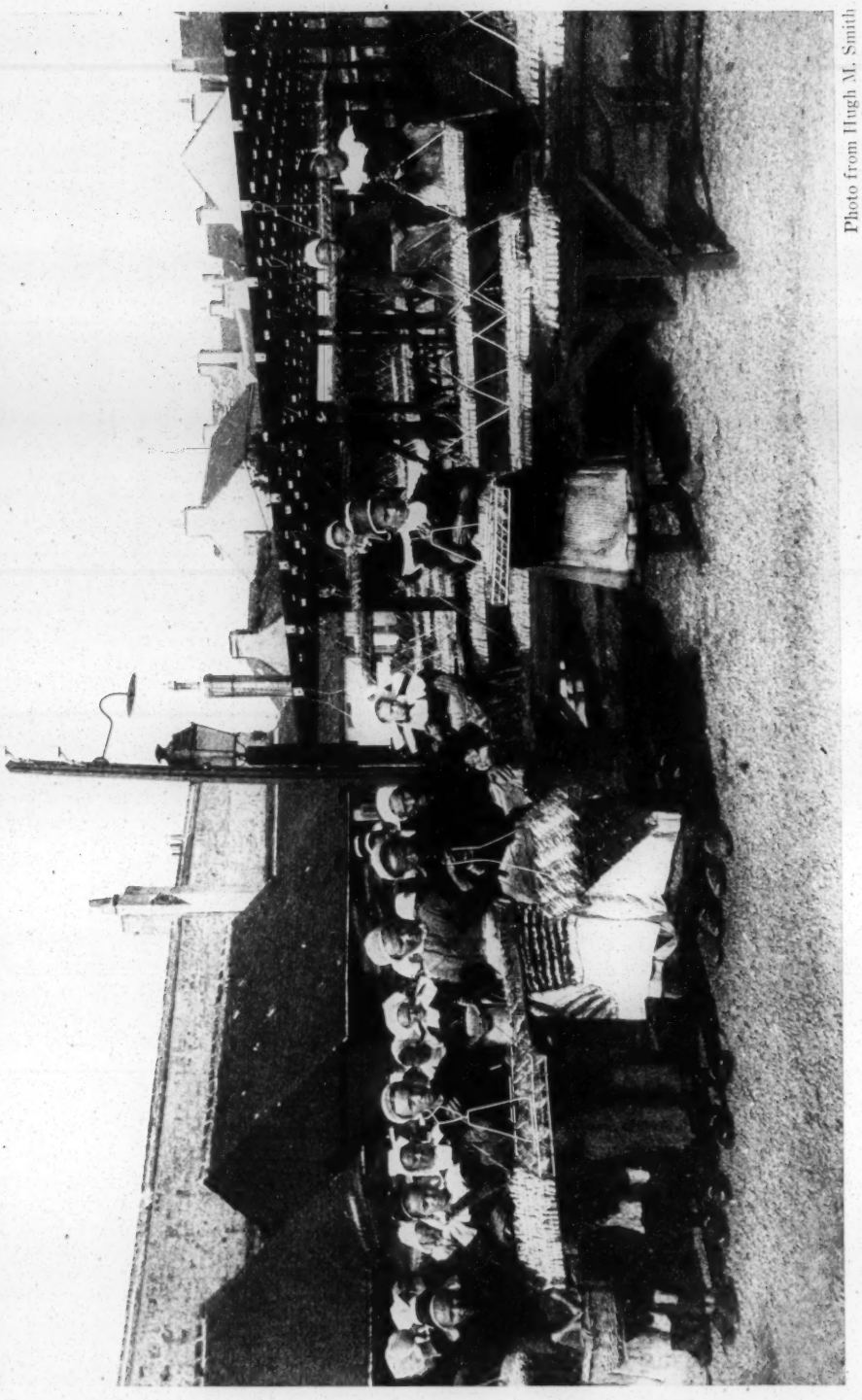
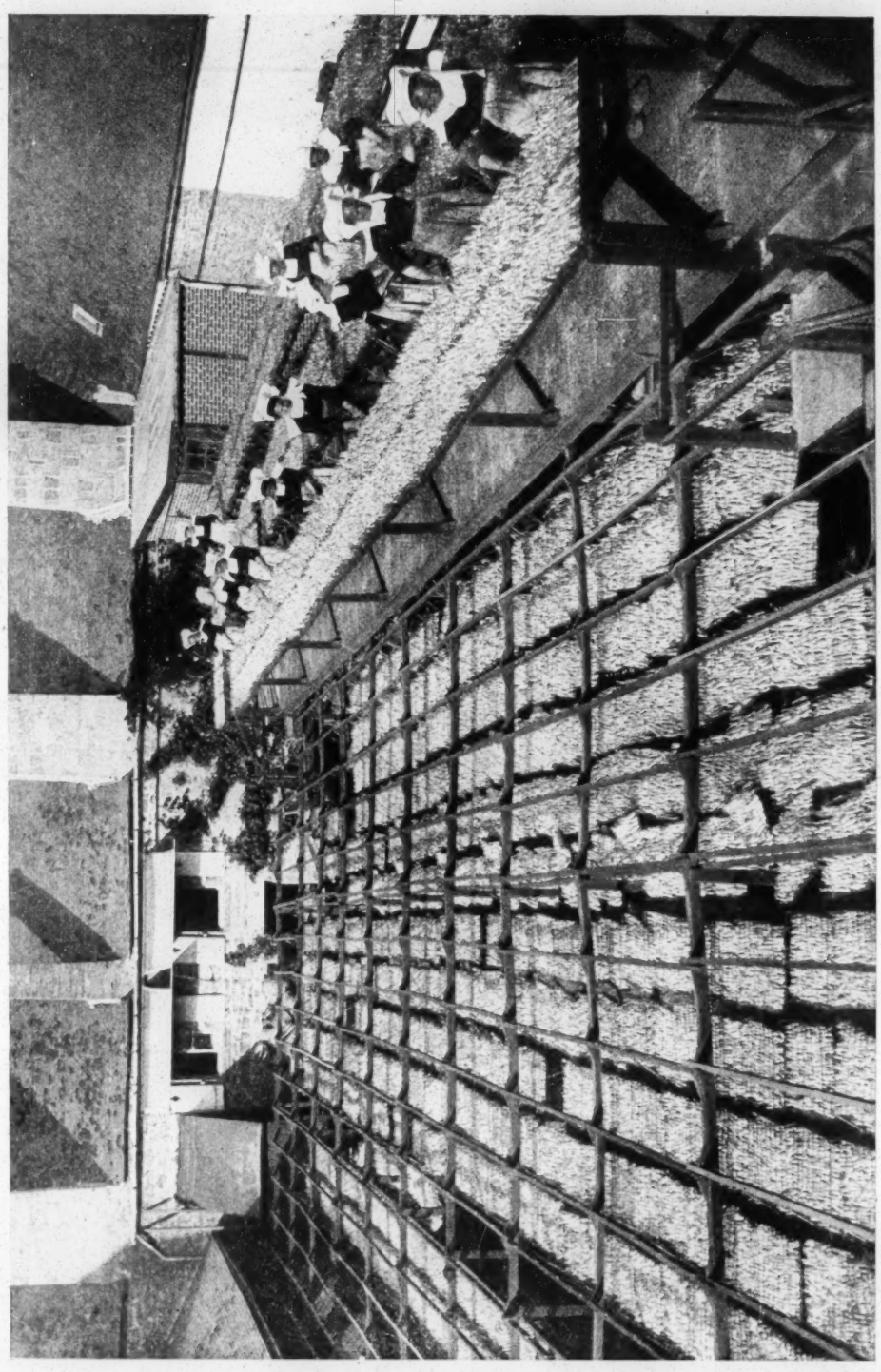


Photo from Hugh M. Smith

WOMEN OF BRITTANY ASSORTING AND ARRANGING SARDINES FOR DRYING IN A CANNERY



VIEW OF A LARGE CANNERY IN BRITTANY, SHOWING SARDINES DRYING ON GRILLS Photo from Hugh M. Smith

bounty of $4 a barrel for roe bait prepared from fish caught by them.

How serious and anomalous this condition of affairs is may be judged when it is stated (1) that a season of great abundance of sardines may find the fishermen with an inadequate bait supply, which greatly reduces the catch and the profits of fishing; (2) that during periods of great scarcity of fish, when to even exist may be a difficult matter, the cost of bait may be almost prohibitive; (3) that the Bretons are apparently willing to pay to the Norsemen a heavy tribute, which during one entire decade in the nineteenth century was never less that $32 a barrel and at times reached $60 a barrel for cod roe; and (4) that the Norwegian government, by prohibiting the exportation of cod roe, could ruin the sardine fisheries of Brittany and place practically the entire population in a starving condition.

When the fishing boats begin to arrive the wharves, which have practically been deserted, assume a very busy appearance, and as the arrivals increase in number the bustle among the different classes of people becomes intense. The foreign visitor here witnesses some exceedingly interesting and picturesque sights—thousands of fishermen in their coarse blouses and flat caps, with trousers rolled up and their feet bare or in huge wooden shoes, unloading their fish and carrying them to the canneries; hundreds of women and girls in their short, dark skirts, white caps and collars, negotiating for sardines, receiving them from the fishermen, and dispatching them to the canneries; sardine boats, either sailed or rowed, entering the harbor in groups or singly and coming up to the docks, already so congested that some of the boats must land directly on the beach; fish wagons going to and from the factories; and a mixed crowd of merchants, sight-seers, artists, and idlers. The commingled noise of waves, boats, wagons, and tongues is underlain by the incessant rattle of wooden shoes on the stony pavements.

Soon after the boats reach port the nets are spread for drying, being hoisted to the tops of the masts for this purpose. When all the fleet has arrived and the nets are hanging in graceful festoons, the view of the maze of masts, sails, and blue nets is most striking.

PECULIAR DIVISION OF THE EARNINGS

It may be a matter of some interest to learn something about the financial side of the sardine fisherman's life. The prices received for the catch depend on supply and demand and on the size and quality of the fish. The fish of each boat are virtually sold at auction to the highest bidder, but there is little counter-bidding, as the prices offered from time to time by two or three canneries are adopted by the others and accepted by the fishermen. Some boats always sell to the same cannery, and all of them, to a greater or less extent, deal with particular factories.

The maximum price that factory operators can profitably pay for sardines is $5.00 per thousand. Taking an average season through, the prices received by the fishermen would be $3.50 to $4.00 per 1,000 for the largest sardines (many of which are consumed fresh), $1.50 to $2.00 per 1,000 for the medium-size fish, and $0.50 to $1.00 per 1,000 for the smallest fish.

The fishermen are not paid in cash, but with tickets or tokens that are redeemed weekly. The men fish on shares, and the apportionment of their lots is complicated enough to puzzle a Philadelphia lawyer and to make expert arithmeticians of the entire population. To illustrate: Each week the gross earnings of each boat are divided into 22 parts, or shares, of which 11 go to the owner of the boat and equipment, 2 to each of the four fishermen, 2 to the master, and 1 to the cook; but the master receives a bonus of 10 per cent of 2 shares, and to compensate for this the shares of each of the four fishermen are diminished by 2½ per cent. These are the very simplest terms in which I have been able to state this arrangement.

BRETON WASHERWOMEN (SEE PAGE 566) Photo from Hugh M. Smith

In ordinary seasons, boats that fish regularly will earn from $400 to $1,200, averaging, perhaps, $600 or $700.

WOMEN DO MOST OF THE WORK IN THE CANNING FACTORIES

It is not needful for us to look into the details of the sardine canning industry, but there are a few points of general interest to which we may devote a few words.

The construction of the first canning establishments dates from 1845, since which time the growth of the business has been uninterrupted and rapid. More than 100 canneries are now in operation, and the output in ordinary years is tremendous, the pack of some of the largest factories being 5,000,000 boxes each.

Practically all the work about the factories is done by women and girls—at good wages. With deftness and expedition they remove the heads and viscera from the sardines, soak the fish in brine, place them in wire baskets or on wooden trays to drain and dry, immerse baskets and fish in boiling oil, pack the fish in tin boxes after cooling, insert spices of various kinds, then fill the boxes with oil, seal them, and put them in vats of boiling water for two hours (to complete cooking, soften the bones, and kill bacteria).

THE CAPITAL OF THE SARDINE INDUSTRY

The chief center of the sardine industry is Concarneau, a town of 10,000 people, of whom 3,500 are sardine fishermen and 3,000 are men, women, and children in the sardine factories. Some of the canneries are operated by American citizens and with American capital, and representatives of foreign dealers in French sardines have their offices here.

Concarneau is a very ancient place and shows the scars of a checkered

BRETON PEASANTS Photo from Mrs Fairchild

career. It has sustained sieges, bombardments, pillage at the hands of the British, and was occupied more than once by these hereditary enemies of the Bretons. In 1377 it was held by a British garrison, all of whom were put to death by the great Duguesclin.

In modern times the town has outgrown the wall and moat that surrounded it and has spread along half a mile of water front, and it has become one of the most attractive places in Brittany for the tourist and artist. No art gallery is now complete without "A Roadside Well in Concarneau," or "A Street Scene in Concarneau," or a "Return of the Sardine Fishermen"; and some of our local artists have brought back some charming sketches. It is, I believe, a fact that no other fishing town in the world has, through the faces and figures of its people, been so extensively represented on canvas.

Perhaps the influx of Americans is due in part at least to the fact that an American woman wrote a novel with Concarneau for its setting. Patriotic feelings impel Americans to read the book, and to accept with credence all that the local guides are able to tell about the characters therein, not the least interesting of whom was the fair authoress herself, who appears to have been the autoheroine of the story.

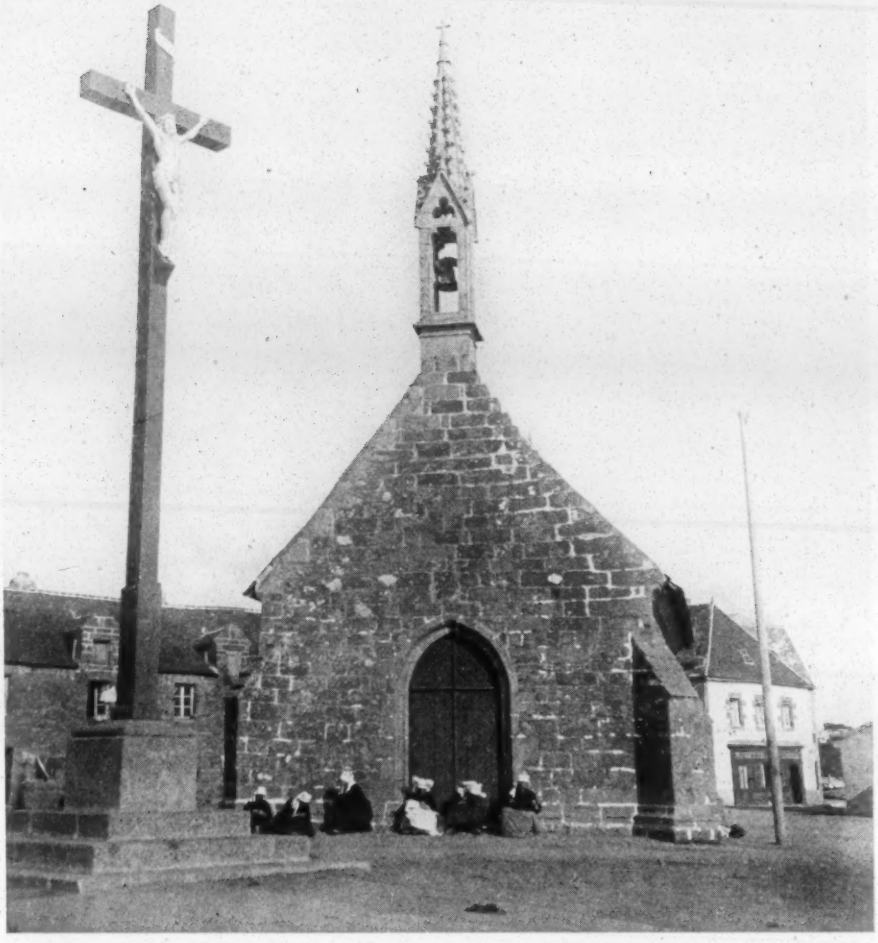


Photo from Hugh M. Smith

A LITTLE FIFTEENTH CENTURY CHURCH IN CONCARNEAU

Filled with votive offerings from the fishermen. The sunny side of the church and the base of the calvary are favorite places for the women to gather to gossip and knit

At Concarneau we may see most of the Breton industries and customs to very good advantage. In a month's visit to Brittany we might profitably spare a week or ten days for sight-seeing in this town and its immediate environs, and at the end of that time we should probably be loath to leave, even if Paris called. To many people the gay capital would have few charms or attractions superior to those offered by this remote little town on the Bay of Biscay.

The churches of Brittany are the magnets to which every heart turns in every community, and it was not surprising that in Concarneau some of the most interesting sights should have centered in and about a plain little church on the

Photo from Mrs Fairchild

THE PROUD PURCHASER OF A PAIR OF WOODEN SHOES

water front, dating from the fifteenth century. I never failed to find a group of women knitting about the doors. From the ceiling near the altar is suspended a large model of a full-rigged vessel presented by a fisherman to satisfy a vow when saved from shipwreck, and on nails and posts about the altar hang several score of china arms, hands, and legs, about half natural size, presented by fishermen and others in gratitude for recovery from disease of those parts.

Near by is a large cross, or "calvaire," which is likewise a great place for loitering, knitting, and gossiping. When the excavation for the foundations of this cross was being made, in 1883, twenty skeletons of men of large size were found, and it was generally believed that they represented English soldiers who had died in one of the numerous attacks on the old closed town.

Market-houses are rarely found in the towns and villages, and the business that is usually done in such places is in Brittany conducted in the open air. Isolated vendors may be seen with their wares in the streets at almost any time; but there are certain days when the farmers' wives come in from the country and are joined by the merchants' wives from the town, and their goods of all descriptions are displayed on the ground, rarely in booths, in a plaza, park, or street set apart for the purpose.

I was awakened in Concarneau early one Saturday morning by a great babel of voices and clatter of wooden shoes

GOING TO MARKET: BRITTANY Photo from Mrs Fairchild

outside the hotel, and I saw from my window an extensive market that had come into existence since the previous evening. Every imaginable local product was exposed for sale—pottery, cutlery, shoes, clothing, vegetables, grains, fish, cattle, poultry, etc.—and each stand or booth was in charge of a woman. The townspeople soon gathered in large numbers, and most animated bargaining and gossip began. This market was continued on Monday, and was participated in by a large number of vendors.

A peculiar round-bottom cart is used by the farmers for hauling all kinds of

truck, but I suspect that the cart is constructed primarily for the accommodation of barrels of cider—a product extensively made in the country districts and extensively consumed in the villages and towns.

The Breton women are very industrious and are seldom seen idle, even when not at their vocation. While resting at home, while waiting about the wharves or farms, and even while walking along the streets and roads, they may usually be seen busy knitting jackets, socks, caps, etc., with most nimble fingers.

The elderly women are particularly fond of impromptu knitting bees, at which conversation never lags. The vehemence with which they then dissect their neighbors, exchange gossip, and discuss village affairs is astonishing, and the language then used is very much coarser than is sanctioned by Parisian etiquette or is employed in their ordinary conversation. Favorite places for their gatherings are the sunny side of a church and about the base of a calvary. As one passes along a country road or a path overlooking the sea, he often comes upon groups of knitting, talking women.

It was always a source of wonder to me to see how scrupulously clean were the caps and collars of the women and girls even when they were engaged in the dirty work about the sardine canneries, and it was likewise a source of wonder that during the fishing season they should have any time in which to attend to their laundry work. I do not know whether in the coast towns there are large numbers of professional laundresses or whether each woman or girl is her own laundress on occasion, but I do know that one meets a surprising number of washerwomen on the country and suburban roads and often comes upon large parties of such women at work.

Washing is done in the open air, on the edges of brooks and ponds, sometimes under the cover of a shed which has probably been erected by the village or town, but more frequently under the sky. Each woman kneels in a little three-sided box resembling the body of a child's wheelbarrow, and has as a washboard a piece of flat stone between the box and the water's edge. The actual work of washing is allowed to interfere but little with conversation, and hence it often happens that one's ears rather than one's eyes first detect the presence of these parties. In the wild moorlands and other places where other facilities are lacking the washing may be carried on in mere ditches, the women standing in the water.

Round the town of Concarneau are numerous curious Druidical remains, including many upright monoliths, or menhirs, in a large tract of country known as "The Place of Grief and Mourning." There are also dolmens, as the horizontal monuments or prostrate menhirs are called. Both of these words are Armorican, and the syllable *men* in each means stone.

It is hardly necessary to say that the Breton peasants and fishermen regard these stones as of supernatural origin, and their childish imaginations ascribe to them all kinds of occult influences. Many a Breton fisherman has satisfied the anxiety of his wife at his failure to appear until the morning after by relating how, on his way home the night before, he sat down to rest at the base of a menhir, and, having fallen into a gentle sleep, he awoke to find that a curious dwarf had taken him inside the stone and kept him there until the sun rose. One of the fishermen told me that to have this interesting experience it was necessary for a man to imbibe a certain amount of liquor, as the dwarf could hardly be expected to appear to a perfectly sober person.

In the vicinity of the village having the suggestive name of Carnac, there is an area thickly strewn with gigantic stone monuments in eleven long lines. The church and most of the houses in Carnac are constructed of these mysterious stones. In the contiguous district, nearly forty miles wide, dolmens and menhirs may be met with everywhere, and one prostrate menhir is sixty-four feet long.

All of the stones were erected in connection with burial and the subsequent worship of the dead, and in this cardinal

A GIGANTIC MENHIR Photo from Mrs Fairchild

feature of the religion of the aboriginal inhabitants some students have seen a strong and suggestive analogy to the ancestor-worship of the Chinese.

These wonderful remains of an extinct civilization occur in all parts of the country. Hundreds of thousands must have been destroyed, but they still constitute the characteristic feature of the landscape. As we stand among them we can sympathize with the ignorant and superstitious peasants, who have weaved curious romances around, and who still perform strange rites among, these relics that, in their judgment, could have been erected only by supernatural powers.

The Bretons are a serious people, and their temperament, their environment, and their vicissitudes have produced just such a soberness of demeanor as we should expect. Most of their diversions are connected with their religion, but they have some pastimes in which they engage with great spirit.

The day following a religious fête is often dedicated to fun and sports and mild dissipation. There may be barrel races for boys, wrestling matches for men, dancing for men and women, and hard cider for all. The Brittany dances are among the most interesting institutions of the country. They are held in the open air—on a town street, in a village square, on a roadside, or in a field in the country.

A dance that I attended in a little village in the interior of Finistère was typical, and was participated in by about forty men and women, all clad in the peculiar garb of the district: the men with a flat, haircloth hat with rolling brim and a black velvet band continued down the back as two long streamers, and with the black jacket and vest trimmed with black velvet; the women with long, beautifully embroidered aprons and elaborate white bonnets. The most celebrated and characteristic

AT A PARDON IN CONCARNEAU Photo from Hugh M. Smith

The image of the patron saint is carried on a platform by women wearing white dresses and bonnets and beautiful lace shawls

of the dances is the gavotte, which is often participated in by several hundred people and lasts for two hours or longer. Music for the dances is always furnished by a pair of artists, usually perched on barrels, one playing a bagpipe, the other a flageolet.

THE PARDONS

The other day a critical friend of mine objected to calling Brittany "The Land of the Sardine" because, as he said, sardines do not live on land. This reminded me that a Breton would undoubtedly refer to his native country by another name—he would call it by the expressive and characteristic term of "The Land of the Pardons."

The significant name of *pardons* is given to those religious fêtes which are held on the day devoted to one of the numerous saints in the district where is centered the worship of that particular holy personage. Some of the pardons are very celebrated and are attended by thousands of people, many coming from long distances; some are observed only in a circumscribed district or parish, and others are confined to the worshippers at a particular chapel or shrine. Those who participate in these fêtes expect to receive forgiveness for past sins and indulgence for future ones. It is at the pardons that the Bretons are always seen at their best and frequently at their worst; for the deep religious feeling and solemn exercises are immediately followed by a sharp reaction, and there is a general yielding to the national vice of drunkenness.

Photos from Hugh M. Smith

PARDON ON THE FEAST DAY OF THE PATRON SAINT AT SAINT GWENOLE, BRITTANY

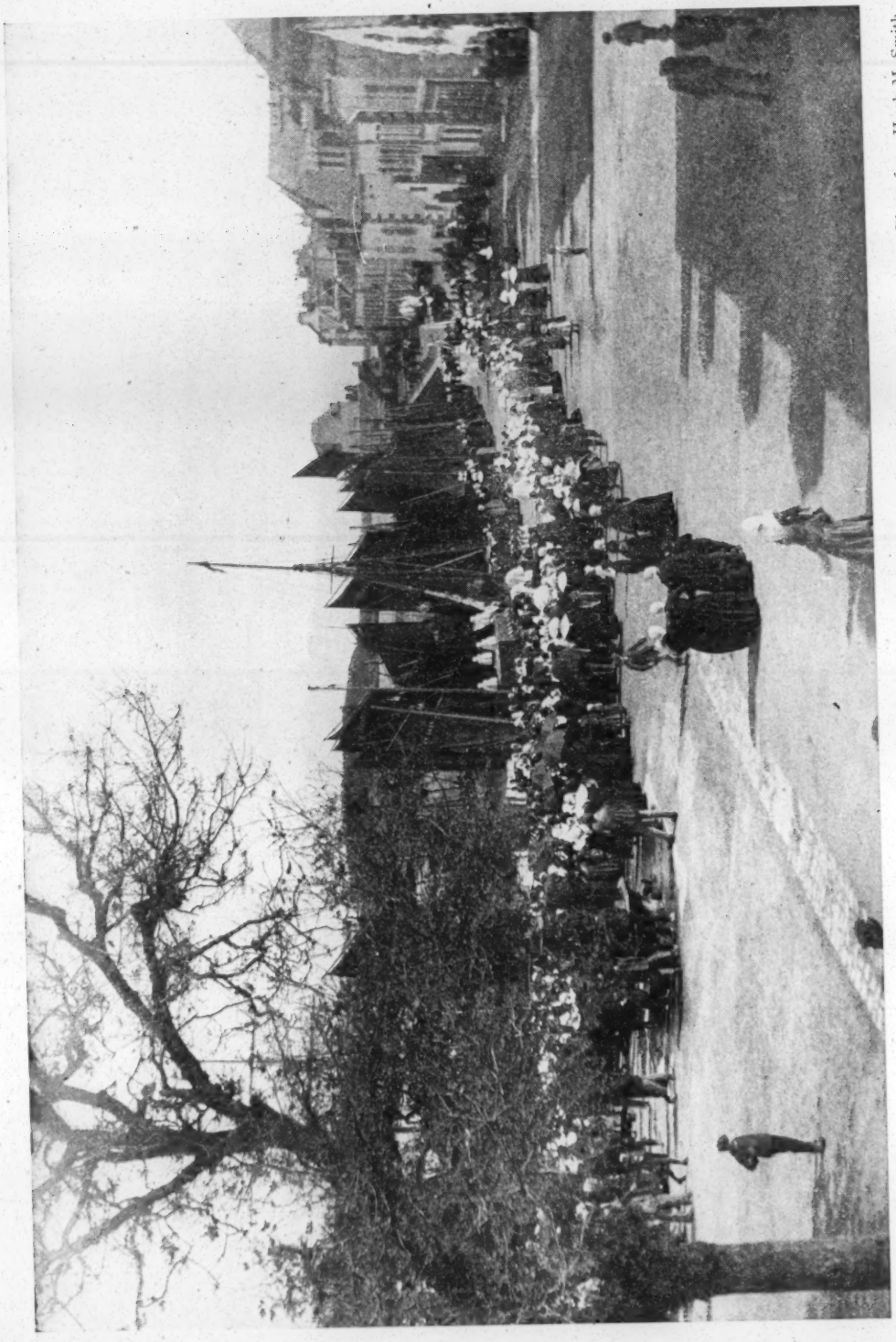
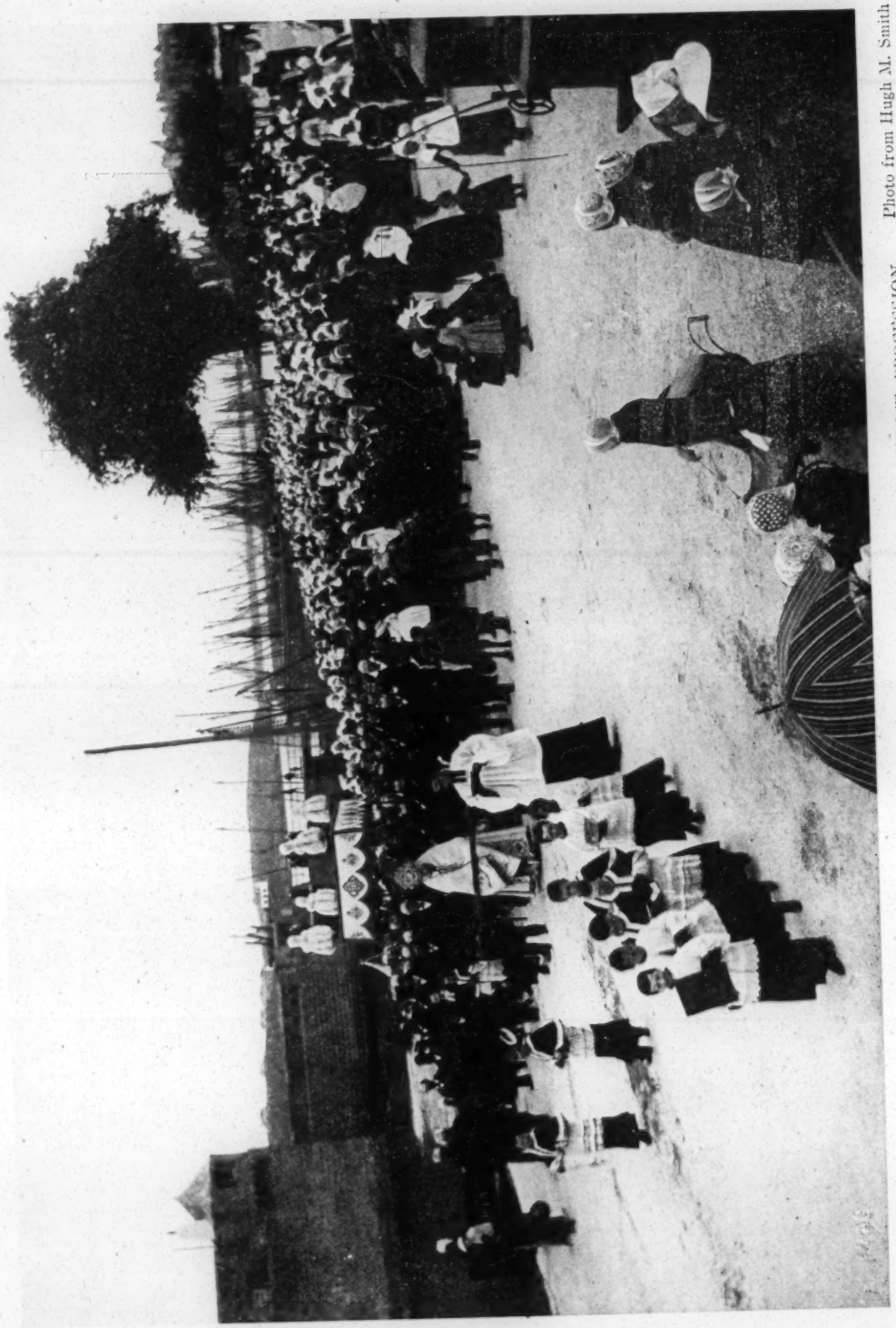


Photo from Hugh M. Smith

A PARDON IN CONCARNEAU

The procession on the water front, with sardine boats at the dock



A PARDON IN CONCARNEAU: ANOTHER PART OF THE STREET PROCESSION

Photo from Hugh M. Smith

Few, if any, among the modern French writers understand the Breton character and language better than Anatole Lebraz, one of whose works, *Au Pays des Pardons,* is devoted to an account of the various pardons celebrated in Brittany. A Breton himself, he has a keener insight into the traits of these people and a deeper sympathy with their beliefs, habits, and customs than an outsider could have.

The pardons are conducted today just as they were centuries ago, and no one not to the manner born can appreciate their full significance to every Breton man, woman, and child.

"It is, in fact, impossible to overestimate the importance in the life of the true Breton of the pardon of his parish, for from his earliest childhood it is associated with the most solemn moments of his existence. As an infant, he is carried by his mother to the church or shrine which is the point of departure of the procession; as soon as he can walk he is allowed to take part in the latter, and he tramps happily along with his playfellows of the village, never owning to weariness, however long the pilgrimage; and when he is old enough he competes eagerly for the honor of carrying one of the banners. It is often at a pardon that he falls in love with his *douce,* as he poetically calls his sweetheart, and it is generally at the dance in the open air that follows the completion of the religious duties of the day that the final words are spoken binding him to her for life.

"It is at the next pardon after their betrothal that the affianced pair win a blessing on their union, and it is at a pardon that they return thanks for the birth of their first child. The sailor or fisherman who has attended a pardon on the eve of a voyage feels secure from the perils of the deep; it is at a pardon that the peasant prays for the fertility of his little holding. To the women of Brittany the annual ceremony is the one event of the year; the dress to be worn at it occupies the thoughts of the young for months beforehand, and large sums are often expended on it; whilst to the old it is a time sacred to memories of the past, when the spirits of those that are gone seem to be present once more, and the days of their own girlhood are recalled, when to them, as to their grandchildren of today, all things seemed possible."*

The pardon that is celebrated with special zeal in the coastwise regions is that of the fishermen and sailors on Saint Anne's day. The people from the different parishes and from adjacent districts assemble in their characteristic costumes and with their sacred banners and relics.

The procession starts from the church and traverses the main streets, the rich banners borne by men and women at the head of different detachments and the images of patron saints carried on a platform by women in special dress. A prominent place in the procession is occupied by those who have been saved from wreck and drowning, and these are followed by the widows of lost sailors and fishermen.

One of the events of special interest that we may witness is the arrival of a party from one of the outlying islands, where, owing to storms, the inhabitants are sometimes isolated for weeks at a time. It is among these insular people that the ancient customs and beliefs persist most strongly, and it is on an occasion like this that we may discover new features of interest in the dress, speech, and manners of the Bretons.

Those who go to Brittany to find sublime or awe-inspiring scenery will be disappointed, for there is none; but those who are satisfied with quiet sights will find much that is most pleasing and attractive.

The waters that wash the shores of Brittany are proverbially boisterous, and the Bay of Biscay in particular is liable to fierce storms. The much-broken coast is skirted with many protecting islands, which, like the mainland, are rocky and in some places quite precipitous. The huge promontory of Finistère might easily pass for the sister promontory in Cornwall, and the extremity of Finis-

* Bell's "Picturesque Brittany."

tère, Pointe du Raz, strongly suggests the Land's End region and is probably the most rugged part of the coast.

Those who enjoy pastoral scenes will find pedestrian and carriage trips along the country roads of Brittany far from dull, especially if one has enough imagination to enable him to enter for a moment into the lives of the diverse types of humanity he will see as he passes along, and if he remembers enough of Breton history and archeology to appreciate their significant relations to landscape and people.

The public roads, some of them dating from the Roman conquest, are, as a rule, excellent. Many of them are of that peculiar type so common in Cornwall and so conducive to the sanguinary guerrilla warfare that has often been waged here—that is, the roadway is separated from the fields and woods on either side by high banks of earth or stone or both, overgrown with herbage and often supporting trees or dense hedges.

To satisfy any longings one may have for the antiquated—and we Americans are particularly prone to rave over ancient structures and ruins because we have none at home—one now and then has an opportunity to visit a feudal castle that was already old when the news of the discovery of America was first brought to the Bretons.

WHEN OUR COUNTRY IS FIFTY YEARS OLDER*

By Raphael Zon, of the U. S. Forest Service

In the last analysis all material wealth, all the comforts and necessities of life, are the product of two elements—nature and labor. It may be truly said that nature, or the earth, is the mother of labor the father of all products necessary to sustain human life. The richness and prosperity of a country, therefore, depend on the presence of natural resources within its borders, such as water, minerals, forests, and cultivable soils on the one hand, and intelligent human enegy on the other to shape them into the forms necessary for the needs of man. Of the two elements the natural resources are indispensable, for in a country like the Desert of Sahara all human effort would be of but little avail. The growth of a nation depends, therefore, upon the extent of the natural resources and upon the knowledge of how to use them with as little destruction as possible.

The resources of a country fall naturally into three groups—water, minerals, and land—which represent, respectively, resources which are inexhaustible, resources which are exhaustible and cannot be renewed and resources which are exhaustible but can be renewed.

It may be questioned, indeed, whether there is such a thing as an inexhaustible natural resource. Even water, through the denudation of the drainage basins, may become irregular in its flow, or through the careless disposal of refuse may become polluted so that it cannot be used. Mines are illustrations of resources which are exhaustible and not renewable. Gas, oil, coal, and iron once gone are gone forever.

Of all the natural resources the only one which contains within itself the possibility of infinite renewal is land. The nation should therefore be most vitally concerned with the conservation and improvement of this resource. Human control over such natural resources as minerals is limited. The only possible means of conservation is the avoidance

*Abstracted from "The Future Use of Land in the United States," by Raphael Zon. Forest Service Bulletin 159.

of waste, but their ultimate exhaustion is unavoidable. With agricultural and forest land, however, it is otherwise. Land cannot only be conserved, but constantly improved and its yield increased. While in England the iron ores and the coal are becoming constantly harder to get and their exhaustion is threatened, the agricultural land, after a thousand years of cultivation, is now more productive than ever. The wheat fields of England under intensive cultivation yield 30 bushels to the acre, while the virgin fields of America on an average yield less than 13.

If a far-sighted national policy in the conservation of natural resources is to make provision for an ever-increasing population, then the greatest possibilities lie in the direction of developing the land in all its forms—field, forest, and range—for, notwithstanding all possible economy in the use of the non-renewable resources, they are bound to decrease as time goes on.

THE USES OF OUR LAND WILL CHANGE GREATLY

One hundred years ago the United States east of the Mississippi River was an almost unbroken forest, comprising something over 1,000,000 square miles, or about 700,000,000 acres. Now, after about a century of settlement, there are not more than 300,000 square miles of merchantable forest land in the eastern United States. About 330,000 square miles have been cleared for farm land. The remainder has been culled of its valuable timber and devastated by fire or else turned into useless brush land. With the growth of population and the greater demand for agricultural land, the ratio between farm and forest land will change still further. The forests will be more and more crowded into the mountains and upon soils too thin or too poor for agricultural purposes. It may be safely assumed that in fifty or one hundred years the proportion of land devoted to the different purposes will change almost as much as it has during the past century. These changes will occur especially in the eastern part of the United States, because there the forest is not confined, as it is in the West, to high altitudes, where agriculture is generally impracticable. In the West the forests, with a few exceptions, as in the low country around Puget Sound, are in the high mountains, which rise in the midst of semi-arid plains, and their original area of 150,000 square miles, half of which lies in the Sierra Nevada and in the Cascades and half in the Rockies, has changed but very little since settlement. In the West the increase of agricultural land must be secured chiefly through the irrigation of the semi-arid land.

If we take a long look ahead into the future and try to picture to ourselves what will be the ultimate proportion of farm, forest, range, and desert in this country fifty years from now, in the light of the increasing demand for agricultural land and of an approximate knowledge of the climatic conditions and the physical properties of the different lands in this country, we shall get something like the condition shown in the diagram on page 575.

ONE-HALF OF THE UNITED STATES WILL BE CULTIVATED

The area devoted to agriculture in a half century, instead of being 21 per cent of the total area, as it is now, will be nearer 50 per cent. That this is not an overestimate is indicated by the fact that during the last fifty years the improved farm land in this country has advanced from 113,000,000 acres to 415,000,000 acres, an increase of nearly 370 per cent.

With more intensive methods of cultivation larger yields will undoubtedly be obtained from the same area, yet the area itself under agricultural crops will have to be increased, especially if we are to remain an exporting country.

In Belgium the arable land forms 63 per cent of the total land area, in Denmark 68, in France 48, and in Germany 47. These countries are not exporters of cereals, although their methods of

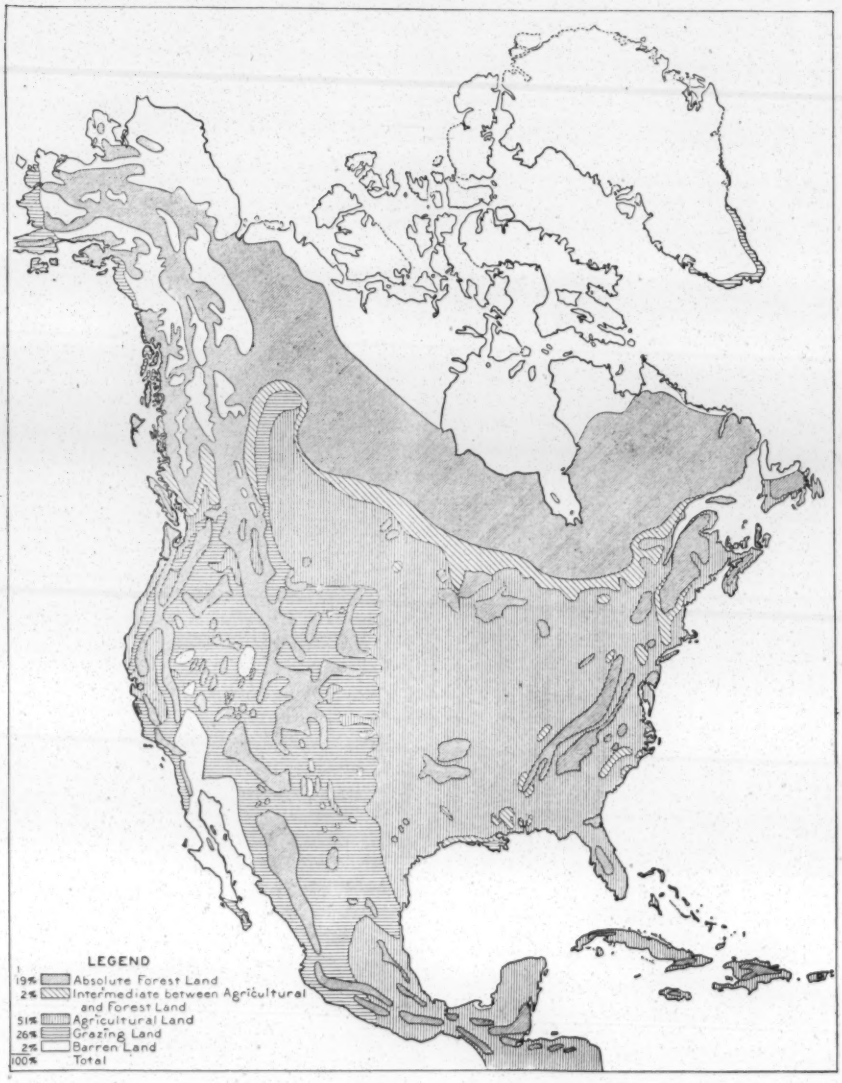


DIAGRAM SHOWING THE PROBABLE USES OF THE LAND OF NORTH AMERICA 50 YEARS HENCE

cultivation are highly developed. France is especially interesting as a criterion, because its methods are most intensive and it is the only country that is self-sustaining; it produces 98 per cent of all the cereals which it consumes. There is little doubt that our population in the next fifty years will reach at least 150,000,000, or about 50 persons per square mile. Whether the acreage of improved farm land will increase at a much faster rate than the population, as has been the case in the past, or whether it will grow at the same or even a slower rate than the population, the future alone can tell; but increase it must.

In mountainous Switzerland only 17 per cent of the land is cultivated, and in

Photo from U. S. Forest Service

REDWOOD CUT ON VANCE'S PROPERTY, HUMBOLDT COUNTY, CALIFORNIA

Sweden and Norway, situated in an unfavorable climate and with a scanty population (29 and 18 persons per square mile, respectively), the proportion of arable land is 8.7 per cent and 1.3 per cent, respectively.

OUR NATURAL RANGES WILL REMAIN THE SAME, BUT THEIR PRODUCTIVENESS WILL BE VASTLY INCREASED

Land chiefly valuable for grazing will form about one-fifth of the extent of the United States proper. This land originally lay west of the one hundredth meridian, in the plains and mountain valleys, but with the advance of dry farming its eastern boundary has been shifted farther west to about the one hundred and third meridian. This land receives but a scanty rainfall and can produce neither forest nor field crop, but supports a vegetation of hardy grasses. It was formerly the natural range of millions of buffalo and is now the grazing ground of herds of cattle and sheep. This land will remain largely a natural range, since the area which can be irrigated, and thus reclaimed for agricultural purposes, or which can even be used for dry farming, is comparatively small.

According to government estimates, the available water will be sufficient to irrigate 71,000,000 acres, or 1 acre in 7½ of the entire region. The Reclamation Service, however, does not expect to reclaim more than 5 per cent of all the arid land. This area, together with that used for dry farming, will barely suffice to counterbalance the reduction of the productive area in the United States through the growth of cities, the building of railroads, and the general development of commerce and non-agricultural industry. The possibilities for increasing the productiveness of the 300,000,000 acres of our public grazing land are very great.

About 2 per cent of the total land area will forever remain desert. There are but few areas within the United States which, on account of the intense heat, very low temperatures, alkali, or lack of rainfall, are unfit for the use of man and may be truly considered desert land. Such land is found in the Southwest about the Gulf of California, in Nevada, in Utah, and in Oregon in the form of arid basins. Ice-bound deserts are found in Alaska and on the glacier-covered mountains. This land must, so long as the climatic conditions of the country continue as they are, remain unproductive.

WILL OUR FORESTS BE SUFFICIENT FOR OUR NEEDS

The land chiefly valuable for growing forests will shrink to about 360,000,000 acres, less than one-fifth of the extent of the United States proper. Together with the wood lots, which will continue to form part of the farm land, the total forest area will amount to approximately 450,000,000 acres, or a fourth of the total land area.

Will this area be sufficient to provide a population of 150,000,000 people with all the timber needed for construction, ties, poles, pulp, and all the various uses for which wood seems to be the only suitable material, and to protect the soil from erosion, regulate the stream flow, and exert its wholesome influence upon the lives of the people?

With the exception of those countries which have naturally a humid climate, like Great Britain or the Netherlands, the countries with a forest area of only 20 per cent or less show usually to a marked degree bad climatic conditions, with prolonged droughts, frosts, and alternating floods and low water, as a result of the reduced forest area. Portugal, with a forest area of only 3½ per cent of the total; Spain, with 16 per cent; Greece, with 13 per cent; Turkey, with 20 per cent; and Italy, with 14 per cent, are good examples.

While the area absolutely necessary for the regulation of streams and the protection of soils can be determined only approximately and indirectly, the area necessary to make a country self-sustaining as regards the production of timber can be found with greater accuracy. If we compare the exports and imports of the different countries with the forest area for every 100 inhabitants, we find that countries with 92 acres or more per 100 inhabitants have a surplus of exports over imports, while those with 85 acres or less have a surplus of imports over exports. Apparent exceptions to this rule appear in the cases of Bulgaria and Servia. These countries, while at present importing more wood than they export, possess considerable areas of forest, now inaccessible, and, with the development of means of exploitation and the increased demand for lumber, they will in time become exporting countries.

From this we may infer that a country in order to be self-sustaining as regards its timber supply must have an area of about 100 acres of forest land for every 100 inhabitants. The area necessary to supply all the wood needed for home consumption will vary, of course, with the per capita consumption; and the 100 acres per 100 inhabitants must be considered the minimum area, because it is based upon a moderate per capita consumption, such as is found in densely populated countries of Europe, like Germany or France.

The same minimum area for every 100 inhabitants necessary to make a country self-sustaining can also be deduced in another way. At present Germany imports 353,000,000 cubic feet of wood from abroad. To produce this amount of timber Germany would have to possess a forest area of 17,000,000 acres in addition to the 35,000,000 acres now available. In other words, she would need 52,000,00 acres of forest in order to meet her own timber requirements, or 93.2 acres for every 100 inhabitants. Germany is an extremely good example with which the productivity of the forests of all other countries can be compared, because her forests can be taken as a standard of productiveness.

A TIMBER FAMINE NOT UNLIKELY

In this country, where the per capita consumption is six times as great as that in Germany or France and the annual growth per acre may be estimated roughly as one-third of that in those countries, the forest area would have to be 1,600 acres for each 100 inhabitants, or more than twice the present area, in order to maintain the present cut. The present area of 775 acres for every 100 inhabitants at the present per capita consumption and annual growth per acre would be insufficient to meet our own needs if there were not present a supply of virgin timber, the accumulated capital of centuries, to meet the deficiency. With the exhaustion of this remaining virgin supply, which can last only about thirty years more, there must come a time when not only all our exports of timber must cease, but there will not be enough wood for home consumption.

Even as it is, the total exports of wood from this country amount to only 5 per cent of the lumber cut, while the surplus of exports over imports is only 1.8 per cent—an insignificant amount. This shows clearly that we have practically ceased to be an exporting country, and the tendency will be more and more toward becoming a wood-importing country.

How shall this shortage be met?

With an increasing demand for land for agricultural crops there is little hope of increasing the extent of forest land. As we have seen, the area necessary for this purpose would have to be more than double the present area, and this is entirely out of the question. Much of the land now under forest, but capable of producing crops, will have to be cleared and tilled to provide for an increased population. All the evidence, therefore, is that the land under forest will, during the next fifty years, be reduced to 450,000,000 acres, and this reduced area will have to provide for a population almost twice as large as the present. Nor will there be much hope for covering the shortage in our home production by importations from abroad.

NO HELP FROM ABROAD

The demand for timber is constantly growing all over the world. It increases at the rate of 5 per cent annually. If we compare the total excess of imports over exports of all wood-importing countries of Europe with the total excess of exports over imports of all wood-exporting countries, we shall find that there is a deficit for Europe of 141,000,000 cubic feet, which is met at present by imports from North America. Sweden, Norway, and Austria-Hungary have already touched the highest point in their exports. Russia could probably increase to some extent its exports from the north, where there are still large areas of virgin forest, but the growing home consumption and the growing scarcity of timber in the other parts of the Empire make it very unlikely that larger supplies of timber for export will be available. Canada is still able to increase its exports, but the drain upon the Canadian forests is growing every year, and they will remain the only source of supply to satisfy the urgent needs of the rest of the world for coniferous timber after Austria-Hungary and Russia cease to be exporting countries. Under such conditions there will be many bidders for the Canadian timber, and the United States will by no means have an exclusive claim.

The growing demand for wood material must be met, then, not by an increase of the forest land nor by depending on imports from abroad, but by an increase in the productiveness of the forest and a decrease in the waste, to which chiefly is due the fact that the United States has the greatest per capita consumption in the world.

A reduction of the per capita consumption of wood in the United States would not mean a lowering of the standard of living, as would be the case, for instance, with a similar decrease in the consumption of wheat. Abundance breeds extravagance, and the present per capita consumption is not a true indica-

Photo from U. S. Forest Service

MOUNTAIN ROAD WITH PEELED TIMBER (WHITE FIR) HAULED OUT WHERE IT CAN BE REACHED BY THE LOGGING WAGONS: GERMANY

tion of the real needs of the people. Countries with greatly differing standards of living, such as the United States, Sweden, Canada, and Russia, but with abundance of forests, all show a high per capita consumption of wood. The waste in the utilization of our timber products is enormous. We use only 50 per cent of the total volume of the tree and leave 50 per cent to be wasted. We are just beginning to learn the usefulness of many trees hitherto considered worthless. We are just beginning to learn to prolong the life of ties, poles, and posts by means of preservative treatment.

It is safe to assume that by greater economy in the use of wood the per capita consumption could easily be reduced from 260 to 150 or even 100 cubic feet without curtailing in the least the real needs of the people.

THE PRODUCTIVENESS OF OUR FORESTS CAN BE GREATLY INCREASED

The other, even more effective, means of meeting the increasing demand for wood is by increasing the productiveness of the forest land. The annual production of our forests is scarcely more than 12 cubic feet per acre of all kinds of wood, including firewood, of which less than 10 cubic feet is of log and bolt sizes, while for all of Germany the annual growth per acre is more than 38 cubic feet, and the forests of Saxony produce 93 cubic feet, those of Switzerland 50 cubic feet, and those of France nearly 40 cubic feet. Our forests have been badly burned in the past and have been entirely neglected. By proper care and protection the forests of the United States cannot only be made to produce as much as those of France or Switzerland, but they can pro-

duce even more. While a portion of our forests, confined to the North and to the Rocky Mountains, is naturally of slow growth, the bulk of the forests is in the regions extremely favorable to tree growth, as in the Southern Appalachians and on the Pacific coast. They are stocked, on the whole, with very fast growing species, capable of attaining enormous dimensions, and are still growing on a virgin soil possessing wonderful productive power. Under such conditions the annual growth per acre in our forests can easily be increased to two or even three times the present growth within a comparatively short time.

With the per capita consumption reduced to 150 cubic feet and an annual growth per acre of only 50 cubic feet, the 450,000,000 acres upon which we shall have to depend for our timber will be capable of supplying the needs of a population of 150,000,000 people.

That this is entirely within the bounds of realization is well shown in the case of the hardwood supply in the Southern Appalachian Mountains. Studies by the Forest Service in the Cumberland Mountains of eastern Tennessee showed that under protection these woods are capable of producing even at present an average of 50 cubic feet annually. Taking the annual production at only 40 cubic feet, this would mean that the 75,000,000 acres of absolute forest land embraced in the Appalachian region would produce 3,000,000,000 cubic feet annually, which represents practically the total hardwood cut in the country. What is true of the hardwoods is also true of the softwoods in the Rockies, in the Pacific coast mountains, and in the Northeast.

The sooner we realize as a nation that the forest land in this country will have to be reduced in order to make room for agricultural crops and that our only salvation as regards the timber supply lies in increasing the productiveness of our forest land and eliminating all possible waste, the sooner we shall solve the problem of the source of the future timber supply. From a national economic point of view, it is an enormous waste to allow 550,000,000 acres of burnt-over and neglected land to go on producing an amount which, under proper forest management, could be produced by an area half as large, and thus preventing the other half from being used for some other purpose.

What is true of the forest as a source of timber is also true of the forest as a protective cover. The influence of the forest on the climate and the flow of water in streams depends not merely on its extent, but chiefly on its condition. A vast forest area repeatedly burned, with the humus cover destroyed, has not as much value as a smaller forest area fully stocked with rich vegetable mold and the soil in good condition.

A CAREFUL CLASSIFICATION OF OUR LAND IS REQUIRED

It is the duty of the government to help the people in adjusting the various lands for the uses to which they are best adapted by classifying them upon the basis of their properties and the climatic conditions. A thorough survey of the lands in the United States with the view of determining the best use to which the various classes could be put would go a long way toward bringing about the most productive use of our greatest resource—the land. In 1898 the Japanese government appropriated about $13,000,000 for the purpose of classifying the land within the government forests into exclusively forest land and land that could be used for agriculture.

Fortunately, the physiographic and climatic conditions of our country are such that, no matter how great the demand for agricultural land may be in the future, the area exclusively adapted to the production of timber should, if properly cared for, be large enough to supply all of our needs for wood and to exercise the protective function.

It is, therefore, not by resisting the inevitable economic progress of this country that we can best solve the serious problem of providing for the future timber supply, but by looking the facts squarely in the face and beginning immediately to prepare ourselves for the time when a reduced forest area will have to meet an increasing demand for timber. We must do it now, while it is not too late.

NATIONAL GEOGRAPHIC SOCIETY ALASKA EXPEDITION

IN a previous number of this Magazine announcement was made of an appropriation by the Board of Managers of the National Geographic Society of $5,000 to be expended in research work during 1909. The Committee on Research of the Society with these funds has organized an expedition to spend July, August, and September studying the glaciers of southeastern Alaska. These glaciers are in many respects the most important in the world, geographically; they have been little studied and it is believed that a careful investigation of them will be most useful. The expedition is headed by Prof. Ralph S. Tarr, of the Department of Geography in Cornell University, and author of numerous geographic textbooks, and Prof. Lawrence Martin, of the Department of Geology of the University of Wisconsin. The expedition will leave Seattle on the steamer *Portland* June 24.

Mr W. B. Lewis, of the United States Geological Survey, will accompany the expedition as topographer, and O. D. von Engeln, Instructor of Physical Geography at Cornell University, as photographer.

The party will proceed direct to Yakutat Bay, where Professor Tarr has previously made two expeditions for the United States Geological Survey—one in 1905, the other in 1906. Professor Martin was attached to the first of these expeditions as Special Geographic Assistant.

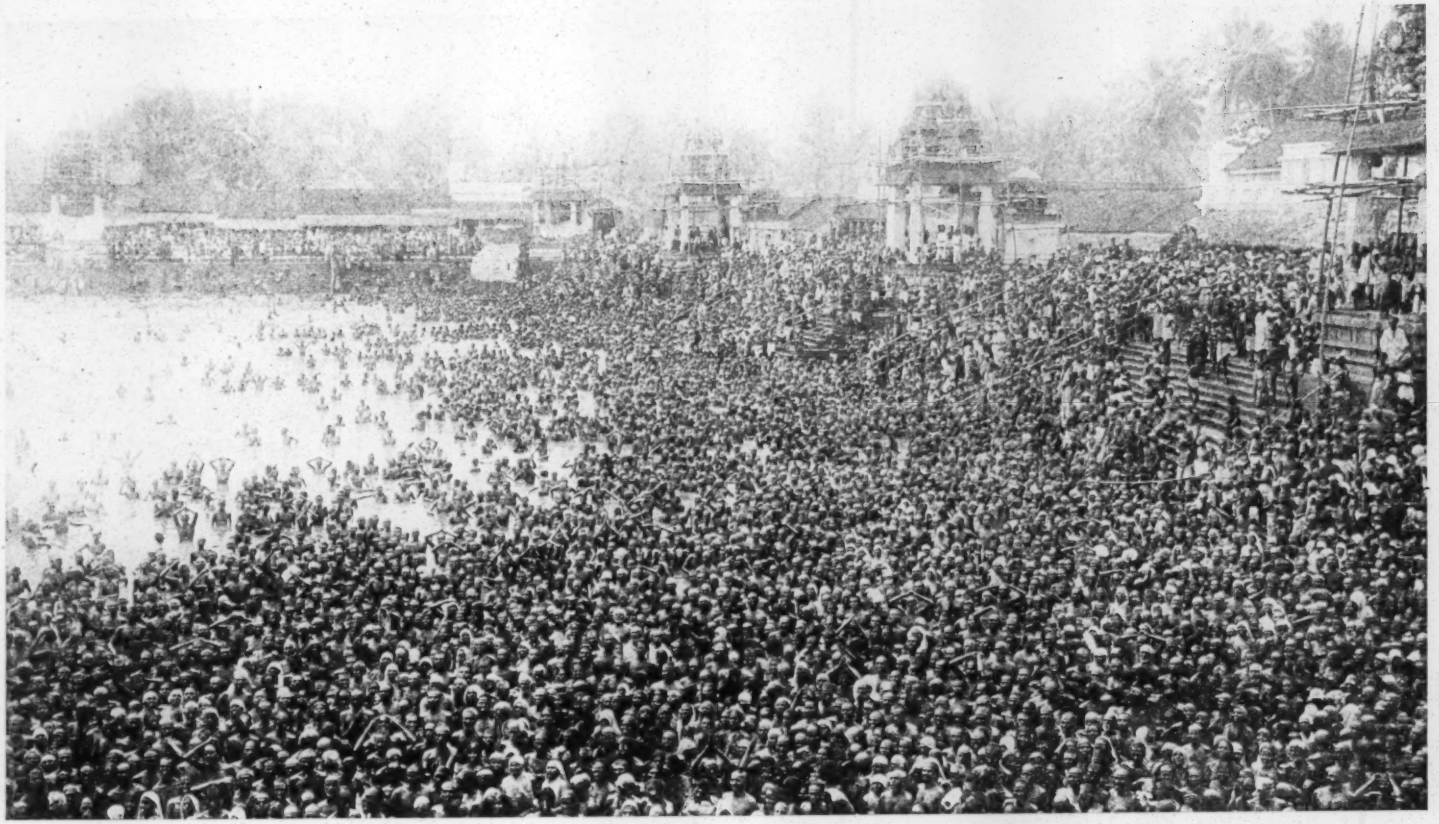
The Yakutat Bay region has yielded rich results from previous geographical work. It was from this base, in 1890, that Professor Russell, under the auspices of the National Geographic Society, made his first expedition to Mount Saint Elias, and it was to the shores of this bay that he returned on his second expedition in 1891. To Professor Russell's expeditions we owe the first thorough description of the great Malaspina glacier, the largest on the North American continent, and the type of the Piedmont glacier. Yakutat Bay was also visited in 1899 by the Harriman expedition, and in Dr Gilbert's report upon the Glaciers and Glaciation of Alaska considerable space is given to the study of the glacial phenomena in this inlet, illustrated by maps made by Mr. Henry Gannett.

COAST ELEVATED 47 FEET BY EARTHQUAKE

In September, 1899, the coast of Alaska, in the vicinity of Mount Saint Elias, was visited by a series of heavy earthquake shocks, and in the expedition of 1905 it was found that the coast line of Yakutat Bay had been greatly deformed at the time of the earthquakes. In some places the coast was depressed, in others it was upraised, in one section to a height of 47 feet, the greatest known elevation of the coast that can be assigned to a single earth movement.

Up to 1905 the glaciers of Yakutat Bay had been in a state of stagnation and recession during the period of observation, but the expedition of 1906 discovered a series of remarkable changes in several of the glaciers. Where in August, 1905, it was possible to walk over the smooth, practically uncrevassed surfaces of these glaciers, in June, 1906, the smooth surfaces were replaced by a sea of crevasses, over which travel was practically impossible. No such sudden change in glacier conditions has ever before been recorded, and the study of the phenomena is therefore a matter of great interest to glacialists. The explanation which has been assigned to this change in glacier condition is that during the earthquakes of September, 1899, vast quantities of snow, ice, and stone were avalanched down upon the reservoirs of the glaciers, giving such a sudden addition to the glacier supply that a wave of advance was started which, sweeping rapidly down the glaciers, broke the rigid, stagnant mass into a maze of crevasses and sérac—a veritable glacier flood.

Since only five out of the many glaciers of the region had felt the impulse of this glacier flood of 1906, it is considered probable that the effect of the earthquakes had not yet reached the ends of



This picture represents one of the heathen festivals held in southern India, to which thousands gather every twelve years from all over India, when, according to devotion or consecration, the devotees fast from one to twelve days and await the appearance of the sacred shell which "comes up out of the water when the priest assigned to the office has 'searched' for it." In their frenzy thousands plunge into the tank or lake, hoping for purification of soul and body when the waters are moved. In the crush many are injured and large numbers drowned, in spite of the precautions taken by the English government to protect life. During this ceremony the gods are anointed with perfumed oils from the lemon, saffron, soapnut, banana, cocoanut, sugar, raisins; then milk is poured over, and the devotees eagerly secure the sacred draught, moisten the forehead and eyes, and then drink what remains in their palms, after which incense and camphor gum are burned. These vast throngs show slight regard for caste, and the rule of seclusion for women is apparently forgotten.

Photo from Mrs Ada Lee

A HINDU RELIGIOUS FESTIVAL

The great annual Hindu religious festival at Gunga Saugar, at the mouth of the Ganges, north India. Thousands of pilgrims flock there every year to perform religious vows and, by bathing in the sacred waters, to obtain purification from sins.

the others, and it is hoped, therefore, that evidence of advance in other glaciers may now be present in this region. It is one of the prime purposes of the present expedition to search especially for changes related to the earthquake shaking. Photographs and maps of the more important glaciers of the region will be made for comparison with previous records and as a basis for future comparisons.

If the work in Yakutat Bay can be finished early enough, as is hoped, the expedition will proceed to Prince William Sound and there undertake the study, mapping, and photographing of the larger glaciers of this region, notably those in the Port Wells Inlet. Following that, if time permits, a reconnaissance trip will be made to Controller Bay and up the Copper River for the purpose of laying out possible future work on the glaciers of this vicinity.

THE LARGEST GLACIERS IN NORTH AMERICA

The glaciers of Alaska, although the largest on the continent, are still known only in part. Their great size and the large number of important results that have been obtained from the studies so far carried on give basis for the belief that a study through a series of years, including the more important Alaskan glaciers, will yield results of the very highest value. It is not merely that the glaciers themselves present interesting phenomena, but also that they throw light upon problems of continental glaciation in northwestern Europe and northeastern North America. The fruitful results of studies from this standpoint depend in part upon the large size of the glaciers, and in part upon the fact that they terminate in a temperate climate near sea-level. In many respects, therefore, the marginal phenomena of the Alaskan glaciers represent more closely the conditions at the margin of the Continental glacier than do even such large ice masses as the Greenland and Antarctic ice caps.

NOTICE TO MEMBERS

ON another page of this number announcement is made by the National Geographic Society of the early publication of a second series of "Scenes from Every Land." It is earnestly hoped that those members of the Society and readers of this Magazine who desire copies of this publication will make their reservation as early as possible. Several thousand members of the Society failed to secure copies of the first series, published two years ago, because of their delay in making reservations. As the Society is put to great expense by the publication, the size of the edition is limited to the apparent demand from the members. The new volume will in every respect surpass its predecessor, and will be more handsomely bound, contain more pictures, and we believe will be more useful, as well as interesting.

The Rockies of Canada. By Walter D. Wilcox. Pp. 8-300, 9½ x 6½ inches. Illustrated. New York: G. P. Putnam's Sons. 1909.

This is a third edition of Mr Wilcox's charming work, with three added chapters. He takes the reader with him to Lake Louise, to Paradise Valley, and to the summit of Assiniboine Mountain, one of the finest, if not the finest, of the summits in the Canadian Rockies (see page 512). He recounts his search for the almost mythical Mounts Brown and Hooker, reputed to be between 16,000 and 17,000 feet high. When finally identified they were found to be not over 9,000 feet in altitude. He explores the Vermilion Pass and visits Moraine, Wenkchemna, and O'Hara Lakes. He gives a charming chapter on camp life and on mountaineering, and an excellent one on the big game of the region. The book closes with some account of the Stony Indians.

While Mr Wilcox's story is delightful, his illustrations are perhaps the finest feature of the book. The thirty-eight photogravures, made from photographs taken by himself, are probably among the very finest specimens of outdoor photography and of reproduction to be found. Indeed, as an artistic photographer Mr Wilcox stands among the first in America. The paper, type, and presswork are of the finest.

The work is accompanied by an excellent map, scale 1:80000, in contours of 250 feet, a reproduction of maps of the Canadian government. H. G.

WALTHAM WATCHES

FIFTY YEARS AGO

FRIDAY, APRIL 22, 1859.—The proprietors and workmen of the watch factory at Waltham were entertained by Gov. Banks at his residence today. About 200 men and women were present.

From Boston Advertiser, April 22, 1909.

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ACROSS

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Lecturer on Latin-American History, Yale University

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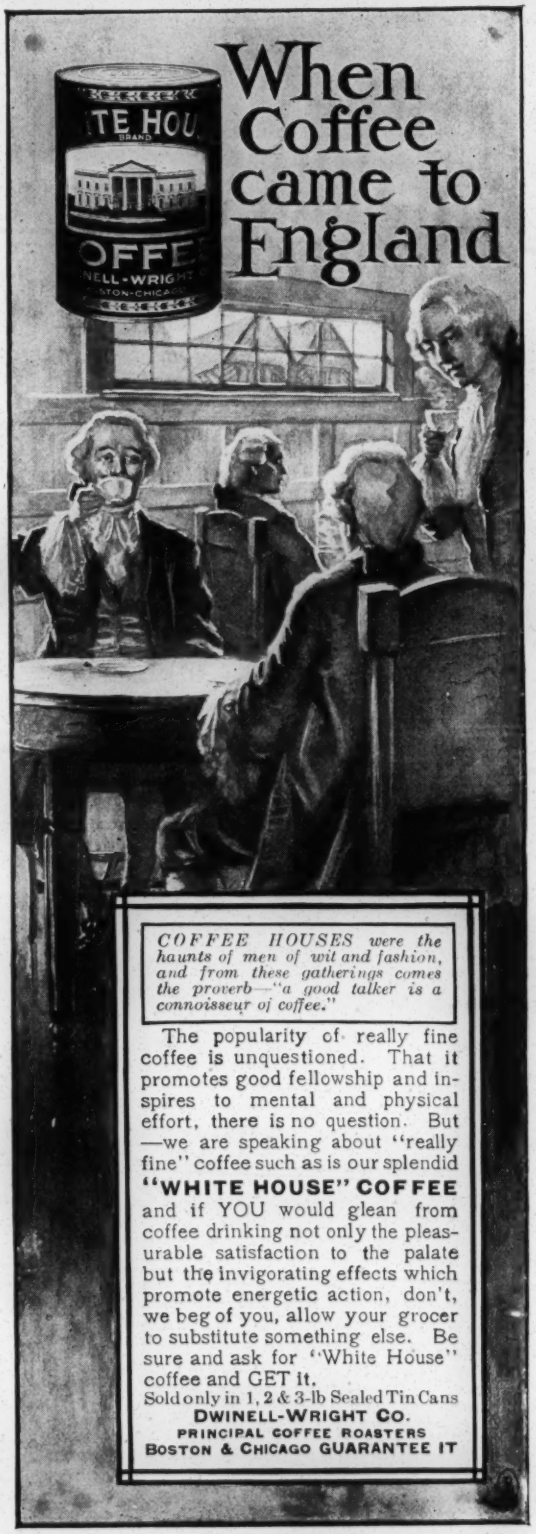
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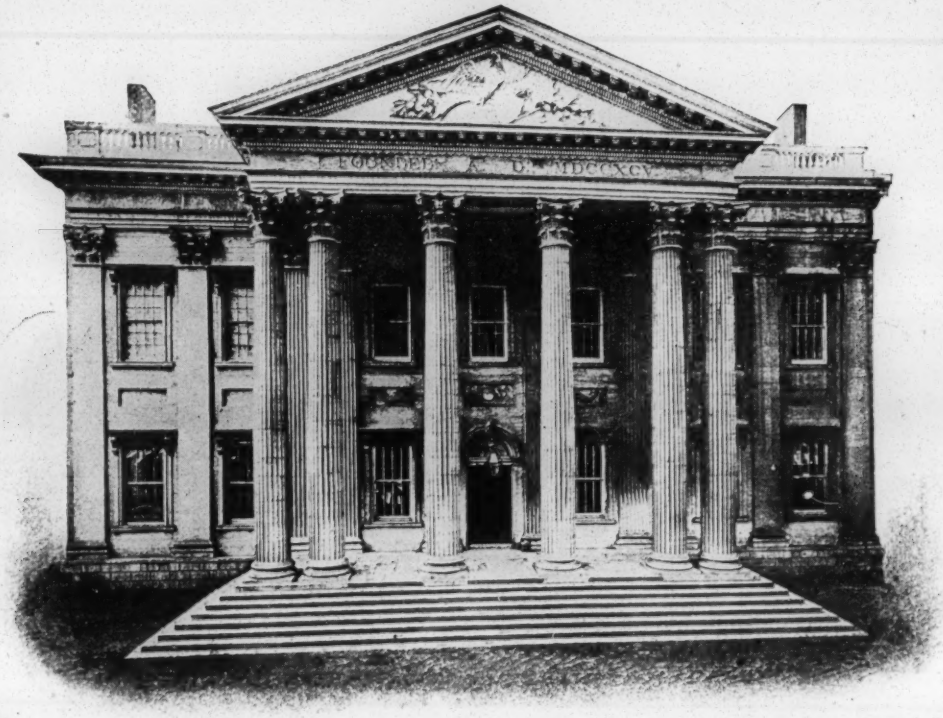

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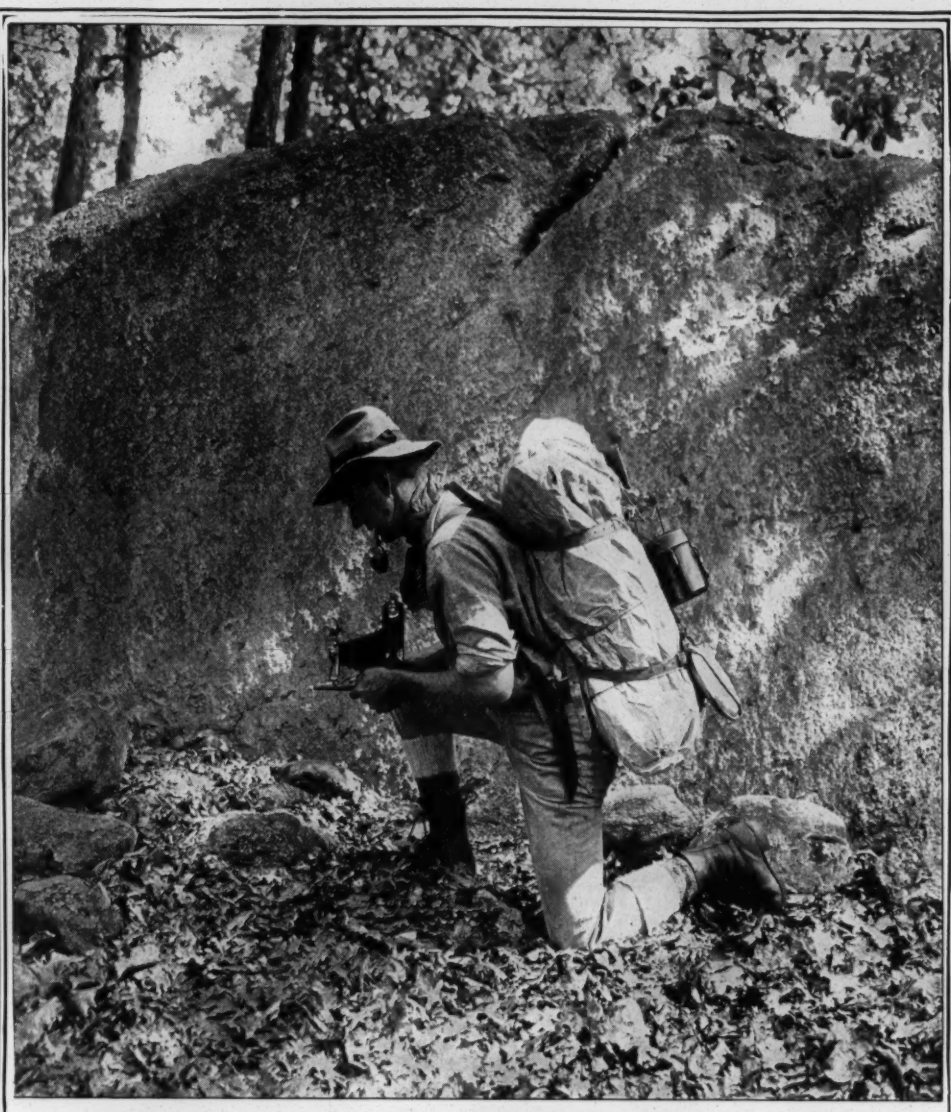

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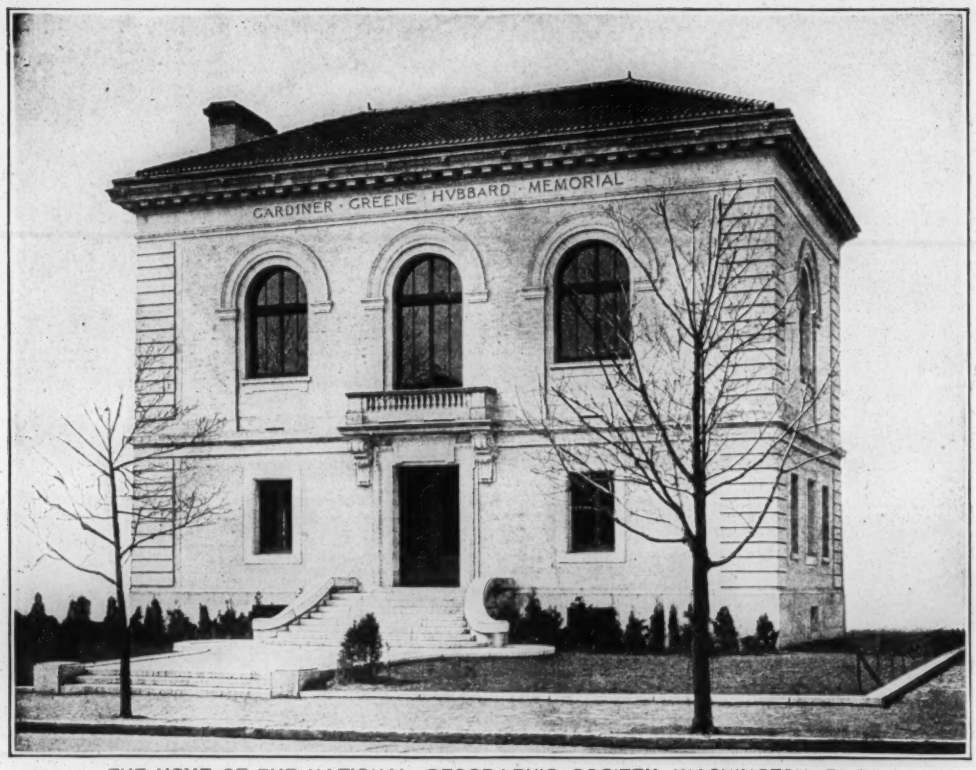

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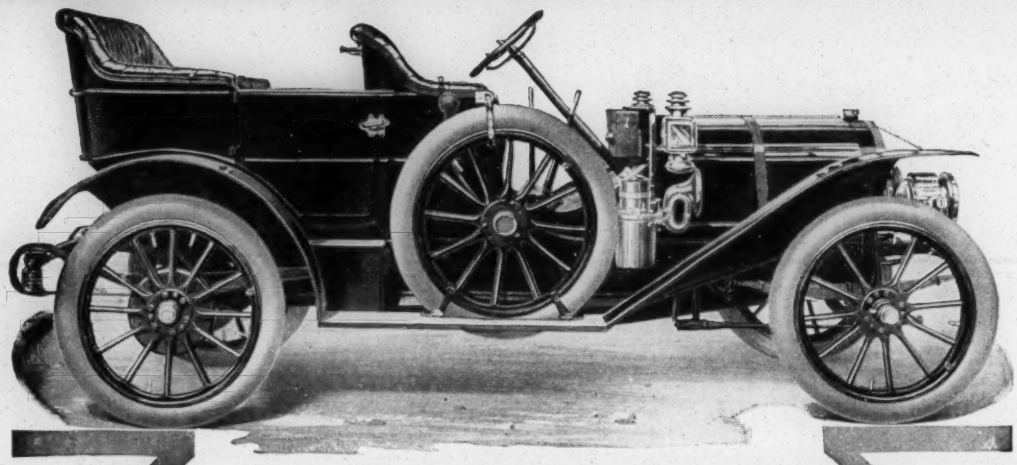

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